Macintosh LC 520/550/575

Macintosh LC 520, Macintosh LC 550,
Macintosh LC 575

Basics

Macintosh LC 520, 550, 575
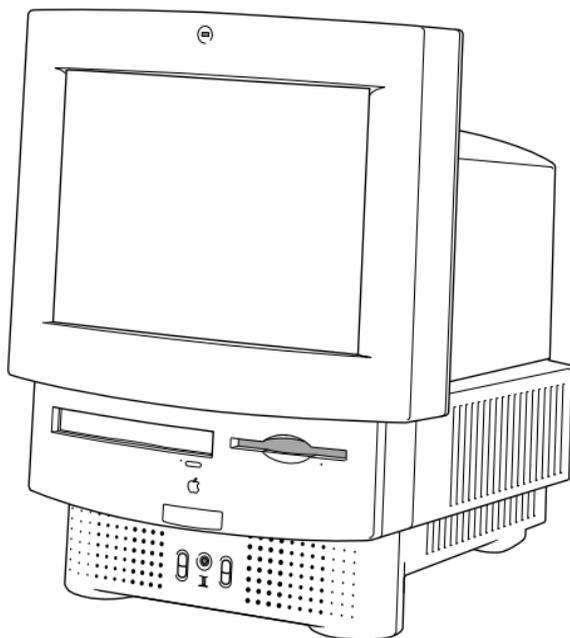
Figure: Macintosh LC 520, LC 550, LC 575

Overview

This manual includes complete repair procedures for the LC 520, LC 550, and LC 575, shown at left.

Product Information

Identifying Features

The LC 575 logic board includes a 68LC040 processor, an additional communications slot, and a new hook-and-loop-attached battery. The LC 520 and LC 550 do not include these features.

The LC 550 and LC 575 ship with
- the newer manual-inject 1.4 MB Apple SuperDrive and require the keyhole-shaped bezel.
- a revised chassis harness assembly that does not use a floppy drive adapter
- the newer, caddyless CD 300+ CD ROM drive

Compatibility Notes

You can exchange the chassis harness assembly of the LC 520 or LC 550 with the newer chassis harness assembly of the LC 575. The newer chassis harness assembly requires the manual-inject floppy drive and caddyless CD ROM drive.

Specifications

Macintosh LC 520, 550, 575

Processor

LC 520   Motorola 68030 microprocessor
                       25 MHz
                       Built-in memory management unit (MMU)

LC 550   Motorola 68030 microprocessor
                       33 MHz
                       Built-in MMU

LC 575   Motorola 68LC040 microprocessor
                       33 MHz
                       Built-in MMU

Coprocessor   Socket for optional math coprocessor

Memory

RAM   4 MB of dynamic RAM on board
                   Expandable to 36 MB (100 ns or faster SIMMs)
                   72-pin DRAM SIMM connector

ROM   1 MB of ROM

PRAM   256 bytes of clock/calendar/parameter memory
                   Long-life lithium battery

VRAM   512K of VRAM on board (displays up to 256 colors or 8-bit
                       color)
                    Expandable to I MB (displays up to 32,000 colors or 16-bit
                       color)
                    68-pin VRAM SIMM connector (LC 520)
                    Two VRAM SIMM slots (LC 575)

Disk Storage

Floppy Drive   Internal 1.4 MB Apple SuperDrive, auto-inject (LC 520)
                        Internal 1.4 MB Apple SuperDrive, manual-inject (LC 550 and
                            LC 575)

Hard Drive   3.5-inch, internal 80, 160, 250, or 320 MB SCSI hard drive

CD-ROM Drive   Internal Apple CD 300i CD-ROM drive (LC 520)
                        Internal Apple CD 300+ CD-ROM drive (LC 550 and LC 575)

I/O Interfaces

Serial   Two RS-232/RS-422 serial ports; mini DIN-8 connectors

SCSI   One SCSI parallel port; DB-25 connector
                          Connects up to six external SCSI devices

Apple Desktop Bus   Two Apple Desktop Bus (ADB) ports; mini DIN-4 connectors
                          Maximum of three ADB devices recommended
                          Maximum current draw: 500 mA (Mouse draws 10 mA; keyboard
                             draws 25 mA.)

Processor-Direct Slot Internal expansion slot for 96 or 114-pin processor-direct
                             expansion cards

Communications Slot (LC 575)   Internal expansion for 50-pin modem and Ethernet cards

Sound   Sound-output port capable of delivering stereo sound
Sound-input port for monaural sound input
Front headphone jack capable of delivering stereo sound

I/O Devices

Keyboard	Standard 80-key Apple keyboard with numeric keypad; ADB connector Soft power-on switch 2.5 mm travel, 18 mm vertical and horizontal pitch Two-level tilt adjustment
Mouse	Apple Desktop Bus Mouse II New, ergonomic design
Microphone	Built-in electret, omnidirectional microphone
Speaker	Adjustable sound control on front of bezel

Sound and Video

Sound Generator   Records at 11 kHz or 22 kHz sample rate
Plays back at 22 kHz sample rate
Two speakers with enhanced stereo sound
Allows playback and recording of ordinary audio compact discs

Video Display   14-in. diagonal, 13-in. viewable screen
Trinitron CRT with high-contrast glass
.26-mm aperture grille pitch
640 pixels by 480 lines; 70 dpi

Electrical

Line Voltage   100–240 VAC; Universal power supply

Frequency   47–63 Hz, single phase

Maximum Power   120 W

Physical

Dimensions   Height: 17.9 in. (45.5 cm)
                        Width: 13.5 in. (34.4 cm)
                        Depth: 16.5 in. (42.0 cm)

Weight   40.5 lb. (18.4 kg)

Environmental

Operating Temperature   50–104° F (10–40° C)

Storage Temperature   -40 to 149° F (-40 to 65° C)

Relative Humidity   20–95% noncondensing

Altitude   0–10,000 ft. (operating)

Troubleshooting

Macintosh LC 520, 550, 575

General

The Symptom Charts included in this chapter will help you diagnose specific symptoms related to your product. Because cures are listed on the charts in the order of most likely solution, try the first cure first. Verify whether or not the product continues to exhibit the symptom. If the symptom persists, try the next cure. (Note: If you have replaced a module, reinstall the original module before you proceed to the next cure.)

If you are not sure what the problem is, or if the Symptom Charts do not resolve the problem, refer to the Flowchart for the product family.

For additional assistance, contact Apple Technical Support.

Symptom Charts

Video

Screen is black, too dark, or too bright; audio and drive operate

1 Adjust contrast button on front bezel.
2 Adjust brightness. Use Screen Control Panel.
3 Check yoke cable connection.
4 Perform video adjustments. Refer to "Video" in Adjustments chapter.
5 Perform battery verification.
6 Replace analog board.
7 Replace CRT.

Screen is bright and audio is present, but no video information is visible

1 Perform video adjustments. Refer to "Video" in Adjustments chapter.
2 Replace analog board.
3 Replace CRT.

Video (Continued)

Single vertical or
horizontal line is
displayed

1 Replace analog board.
2 Replace CRT.

Predominant color
tint or color cannot be
adjusted

1 Perform video adjustments. Refer to "Video" in Adjustments
   chapter.
2 Replace analog board.
3 Replace CRT if red, green, or blue cannot be turned off using
   appropriate controls.

Picture breaks into
diagonal lines, or
picture rolls
vertically or
horizontally

1 Perform video adjustments. Refer to "Video" in Adjustments
   chapter.
2 Replace analog board.

Video (Continued)

Out of convergence
(color bleeds from
text or lines)

1 Perform convergence adjustment. Refer to "Convergence" in
  Adjustments chapter.
2 Replace analog board.
3 Replace CRT.

Black screen spots
(burnt phosphors)

Replace CRT.

Screen jitters or
flashes

1 Verify that adjacent computer equipment is properly
  grounded. Move electrical devices away from monitor.
  Temporarily shut off all fluorescent lights in area.
2 Check that all ground cables are secure.
3 Disconnect internal floppy drive, CD-ROM drive, and hard
  drive.
4 Replace analog board.

Video (Continued)

Out of focus

1 Perform focus adjustment. Refer to "Focus" in Adjustments chapter.
2 Replace analog board.
3 Replace CRT only if one part of display remains out of focus despite adjustment of focus controls to their limits.

Flashing or wavy screen or monitor emits high-pitched noise

Replace analog board.

Raster size too short/ tall or narrow/wide

1 Adjust horizontal or vertical size control. Refer to Adjustments chapter.
2 Replace analog board.

Video (Continued)

Linearity bad (size of text/graphics differs at top, bottom, or sides of screen)
1   Perform video adjustments. Refer to "Video" in Adjustments chapter.
2   Replace analog board.

Raster tilted or shifted
1   Verify that adjacent computer equipment is properly grounded. Move electrical devices away from monitor. Temporarily shut off all fluorescent lights in area.
2   Perform appropriate geometric adjustments. Refer to Adjustments chapter.
3   Perform yoke adjustment. Refer to "Yoke" in Adjustments chapter.
4   Replace analog board.

Video (Continued)

Raster distorted (barrel-shaped, corners not square, stretched or compressed at top of display, or sides not perpendicular)

1 Verify that adjacent computer equipment is properly grounded. Move electrical devices away from monitor. Temporarily shut off all fluorescent lights in area.
2 Perform appropriate geometric adjustments. Refer to Adjustments chapter.
3 Replace analog board.
4 Replace CRT (only in rare instances).

Raster not centered

1 Verify that adjacent computer equipment is properly grounded. Move electrical devices away from monitor. Temporarily shut off all fluorescent lights in area.
2 Adjust horizontal or vertical center control. Refer to Adjustments chapter.
3 Replace analog board.

Floppy Drive

Audio and video are present, but internal floppy drive does not operate

1 Replace bad disk with known-good disk.
2 Replace floppy drive.
3 Replace logic board. Retain customer's SIMMs.
4 Replace floppy drive.
5 Replace chassis harness cable.

Disk ejects; display shows icon with blinking "X"

1 Replace bad system disk with known-good system disk.
2 Replace floppy drive.
3 Replace logic board. Retain customer's SIMMs.
4 Replace chassis harness cable.

Floppy Drive (Continued)

Does not eject disk

1 Insert opened paper clip into hole beside floppy drive.
2 Switch off system and hold mouse button down while switching system on (to complete eject cycle).
3 Remove front drive bezel.
4 Replace floppy drive.

Internal floppy drive runs continuously

1 Replace bad disk with known-good disk.
2 Replace floppy drive.
3 Replace logic board. Retain customer's SIMMs.
4 Replace floppy drive.
5 Replace chassis harness cable.

Floppy Drive (Continued)

Unable to insert disk all the way

1 To eject previously inserted disk, insert opened paper clip into hole beside floppy drive.
2 Switch off system and hold mouse button down while switching system on (to complete eject cycle).
3 Remove front drive bezel.
4 Replace floppy drive.

Hard Drive

Internal or external
hard drive does not
operate

1 Verify that SCSI loopback card is not attached.
2 Verify that external drive is properly terminated.
3 Replace hard drive.
4 Replace logic board. Retain customer's SIMMs.
5 Replace hard drive.
6 Replace chassis harness cable.

Works with internal
or external SCSI
device but does not
work with both

1 Verify that SCSI device ID switch setting on external device
   is higher than 0. Also verify that ID switch setting on
   external SCSI device does not duplicate ID switch settings on
   any other attached external SCSI devices.
2 Replace terminator on external SCSI device.
3 Replace SCSI select cable.

CD-ROM Drive

CD-ROM drive does
not accept disc

1 Replace disc (if dirty or damaged).
2 Remove front drive bezel.
3 Replace CD-ROM drive mechanism.

Volume control does
not operate correctly

1 Reset PRAM.
2 Replace chassis harness assembly.

Macintosh cannot
mount CD-ROM drive

1 Verify proper CD-ROM software is installed.
2 Start up from known-good system, Disk Tools, or external
   SCSI device.
3 Replace CD-ROM drive mechanism.

Peripheral

Cursor does not move
1 Check mouse connection.
2 If mouse was connected to keyboard, connect it to rear ADB port instead. If mouse works, replace keyboard.
3 If mouse does not work in any ADB port, replace mouse.
4 Reset PRAM.
5 Remove additional PDS and CS cards.
6 Replace logic board. Retain customer's SIMMs.

Cursor moves, but clicking mouse button has no effect
1 Replace mouse.
2 Replace logic board. Retain customer's SIMMs.

Peripheral (Continued)

Cannot double-click
to open application,
disk, or server

1 Remove extra system files on hard drive.
2 Clear parameter RAM. Hold down <Command> <Option> <P>
   <R> keys during system startup but before "Welcome to
   Macintosh" appears.
3 If mouse was connected to keyboard, connect it to rear ADB
   port instead. If mouse works, replace keyboard.
4 If mouse does not work in any ADB port, replace mouse.
5 Replace logic board. Retain customer's SIMMs.

No response to any
key on keyboard

1 Check keyboard connection to ADB port.
2 Replace keyboard cable.
3 Replace keyboard.
4 Reset PRAM.
5 Replace logic board. Retain customer's SIMMs.

Peripheral (Continued)

Known-good
ImageWriter or
ImageWriter II does
not print

1 Make sure that Chooser and Control Panel are set correctly.
2 Replace printer driver and system software with known-
   good.
3 Reset PRAM.
4 Replace printer interface cable.
5 Replace logic board. Retain customer's SIMMs.

Known-good
LaserWriter does not
print

1 Make sure that Chooser and Control Panel are set correctly.
2 Replace printer driver and system software with known-
   good.
3 Reset PRAM.
4 Refer to Networks and Communications manual.

Miscellaneous

Clicking, chirping,
or thumping sound

1 Replace analog board.
2 Replace logic board. Retain customer's SIMMs.

Smoke/odor

1 Inspect analog board and logic board for any signs of burnt
   components.
2 Replace analog board.

No video, no audio, and
no drive operation

1 Connect power cord.
2 Switch power on.
3 Replace power cord.
4 Replace keyboard.
5 Replace analog board.
6 Replace logic board. Retain customer's SIMMs.

Miscellaneous (Continued)

Screen shows "Sad
Macintosh" icon and
black vertical lines;
screeching sound

1 Replace RAM SIMMs on logic board.
2 Replace logic board. Retain customer's SIMMs.

Headphone jack does
not operate correctly

1 Verify that headphone jack is seated properly.
2 Replace chassis harness assembly.

Speaker jacks do not
operate

1 Verify that speaker jacks are seated properly.
2 Replace logic board.

System automatically
restarts after
shutdown

Check whether test jumper is installed on analog board (location:
BD 11). If it is installed, remove it.

Miscellaneous (Continued)

"Sad Macintosh" icon
1 Replace bad disk with known-good disk.
2 Disconnect internal and external IDE or SCSI devices. If the flashing "?" appears, re-attach devices one at a time. Troubleshoot software issue on device that produces problem.
3 Replace RAM SIMMs on logic board.
4 Replace logic board. Retain customer's SIMMs.

Take Apart

Macintosh LC 520, 550, 575
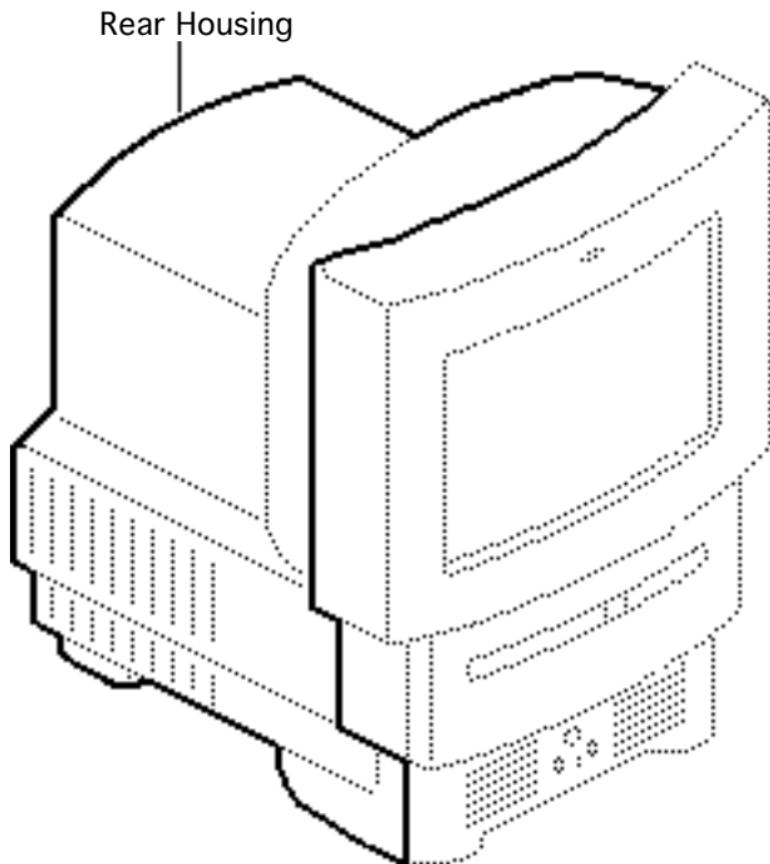
Rear Housing

Rear Housing

No preliminary steps are required before you begin this procedure.

⚠️**Warning:** This product contains high voltage and a high-vacuum picture tube. To prevent serious injury, review CRT safety in Bulletins/Safety.

⚠️**Warning:** Never use a grounding wriststrap until after discharging the CRT.
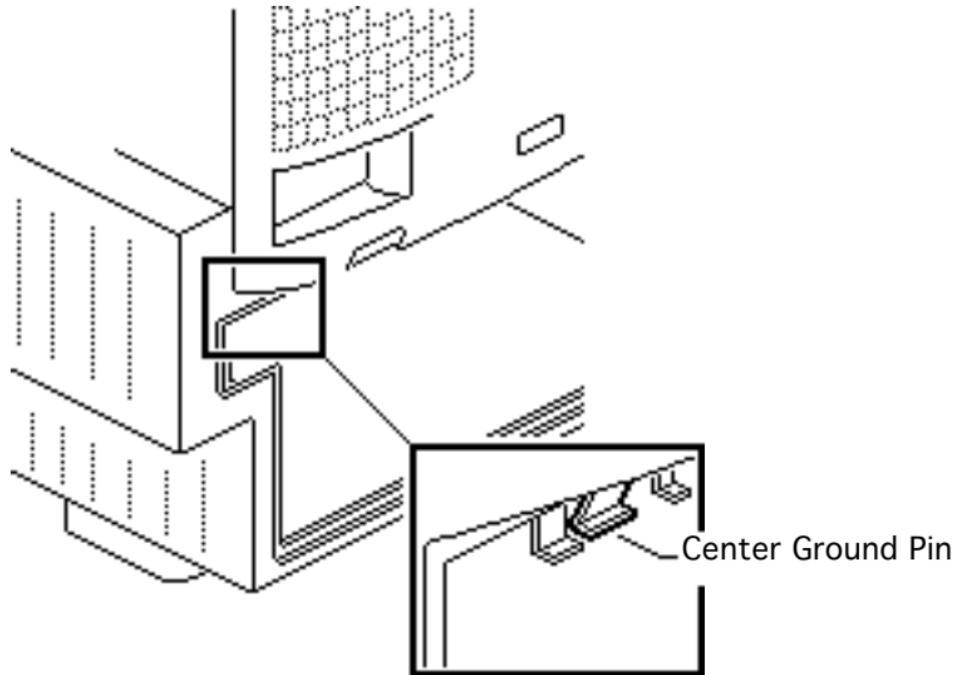
Note: If the rear cover has bronze tape on the rear cover shield, remove the tape before removing the rear cover. Bend back the center ground pin on the rear cover shield about 1/8 inch. Do not replace the bronze tape.

Center Ground Pin

Rear Housing
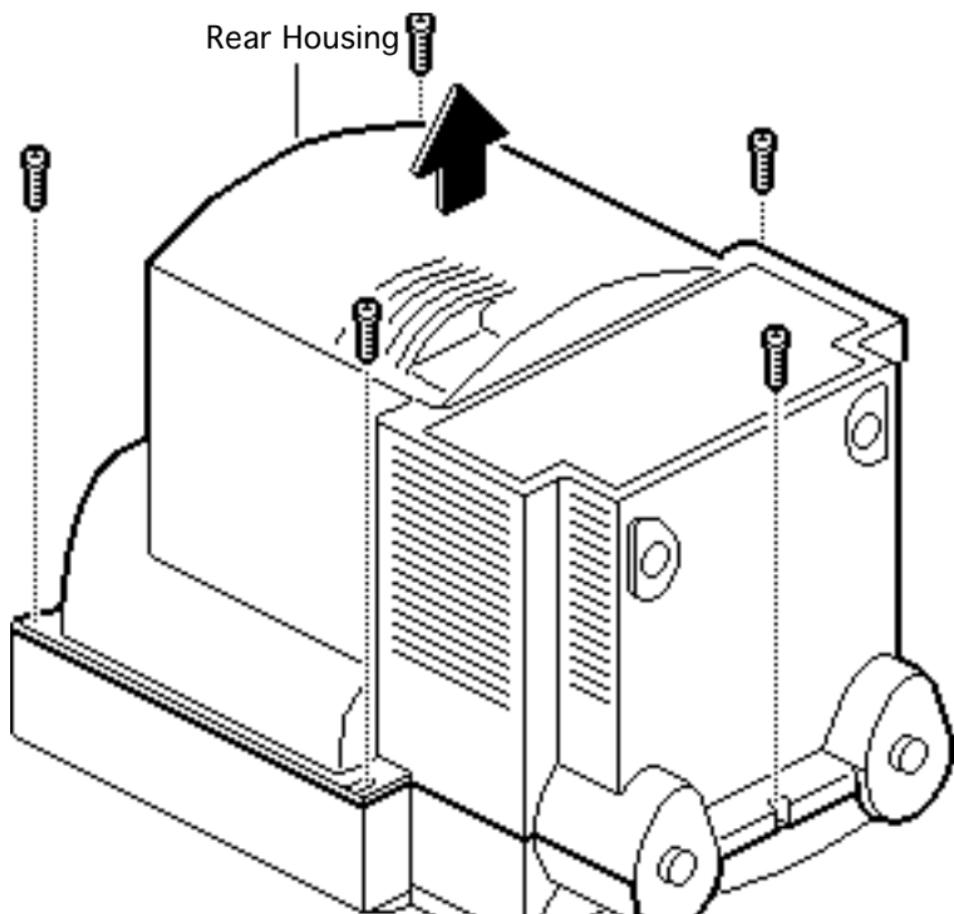
1 Using a Torx screwdriver, remove the five screws.

2 Lift off the rear cover.

Fan
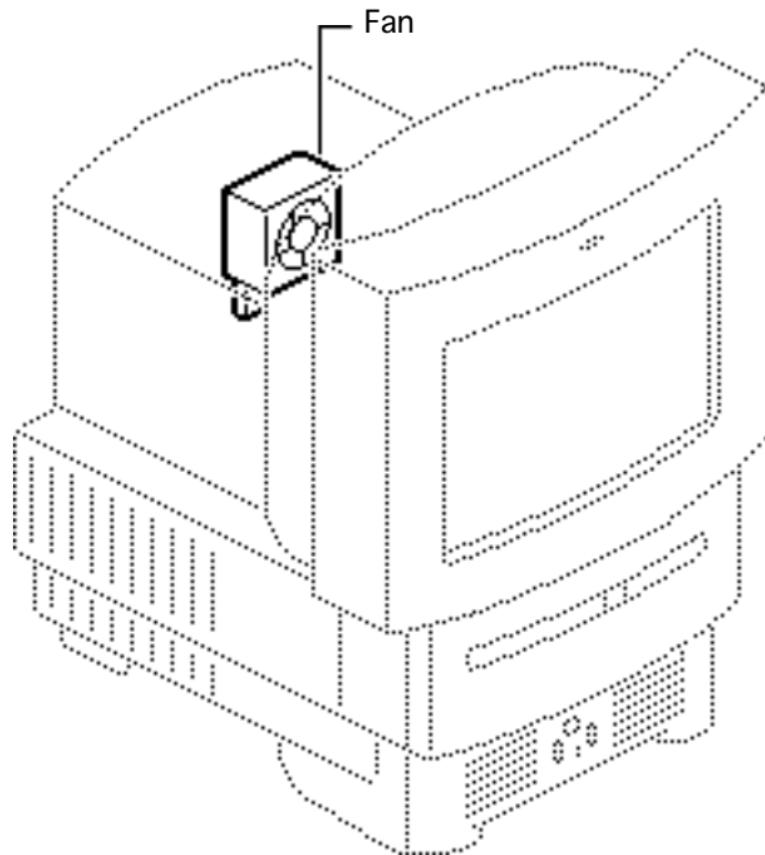
Fan

Before you begin, remove the rear cover.

⚠️**Warning:** This product contains high voltage and a high-vacuum picture tube. To prevent serious injury, review CRT safety in Bulletins/Safety.

⚠️**Warning:** Never use a grounding wriststrap until after discharging the CRT.

Latch

Latch

Fan
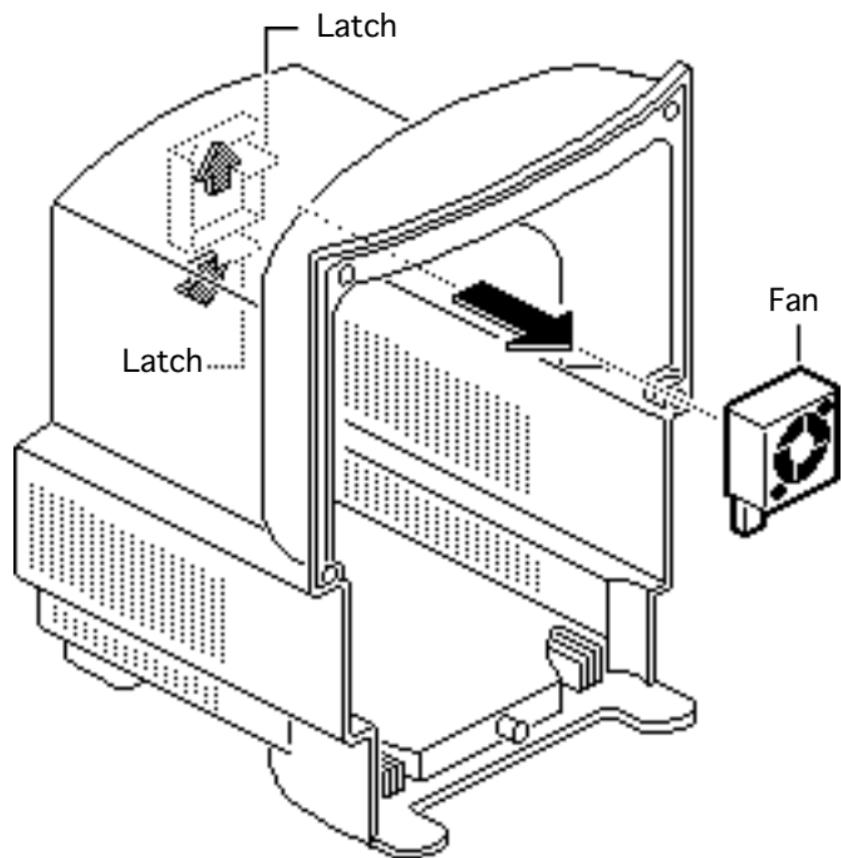
Push out the two latches and remove the fan assembly.

Analog Board

Analog Board

Before you begin,
- Remove the rear cover
- Discharge the CRT
- Remove the anode cap
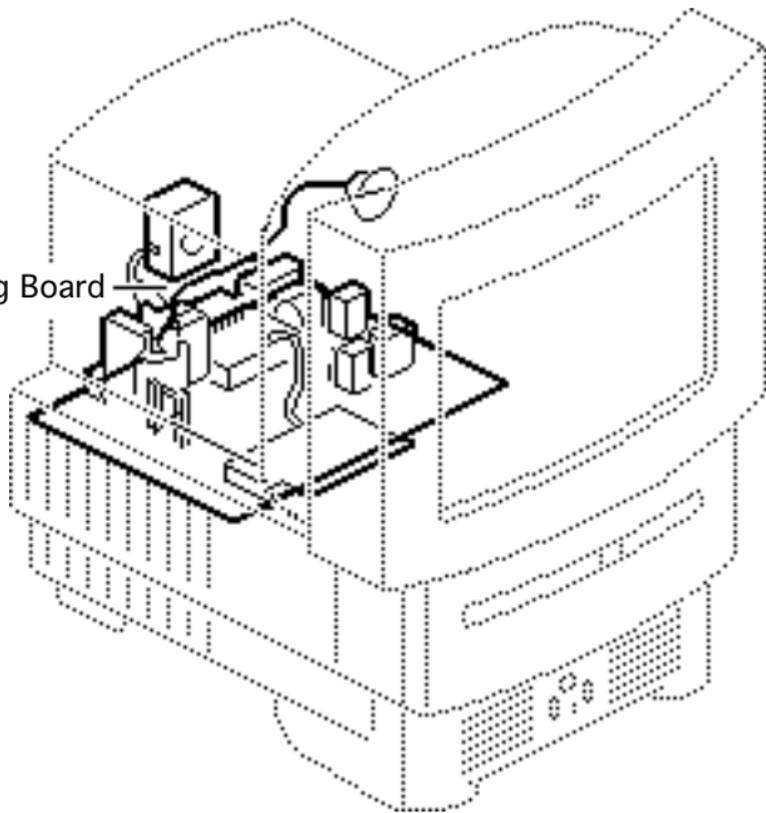
⚠**Warning:** This product contains high voltage and a high-vacuum picture tube. To prevent serious injury, review CRT safety in Bulletins/Safety.

⚠**Warning:** Never use a grounding wriststrap until after discharging the CRT.

Degauss Panel

Ground Cable
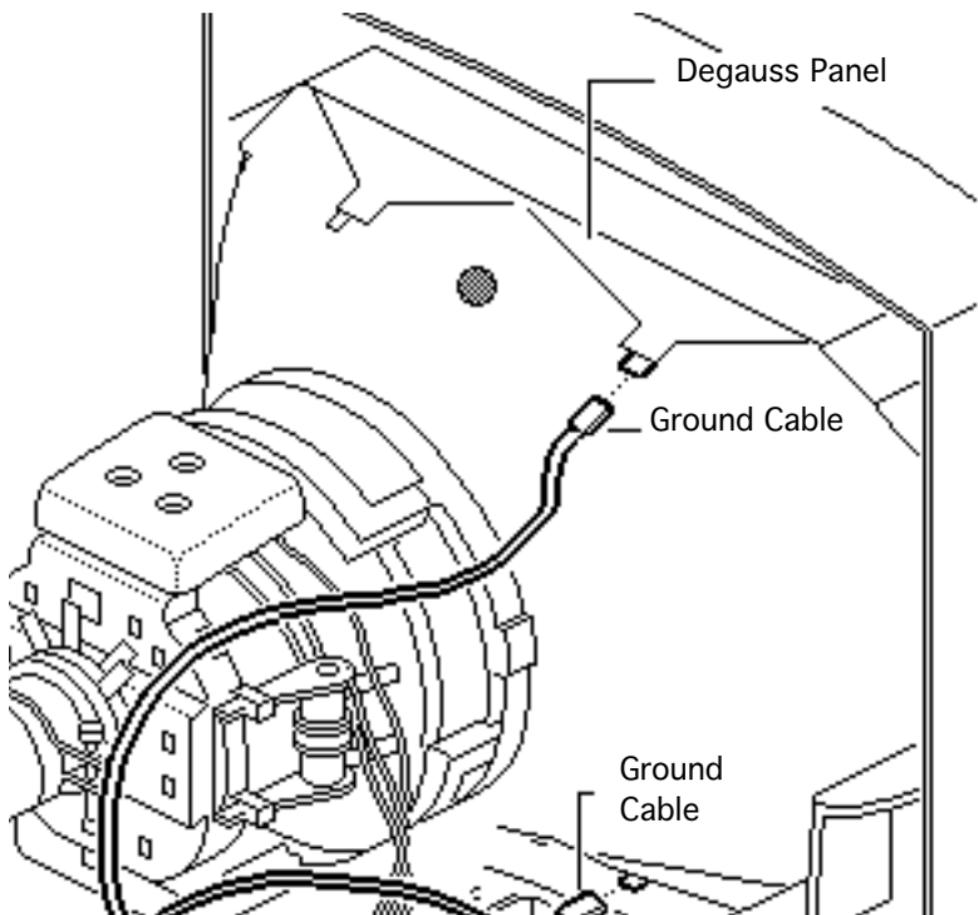
Ground
Cable

1 Disconnect the two
ground cables from the
degauss panels.

2 Disconnect the internal microphone connector.

Internal Microphone Connector

WARNING:
High Voltage Areas

Cable
Retainer

BD1

BP2
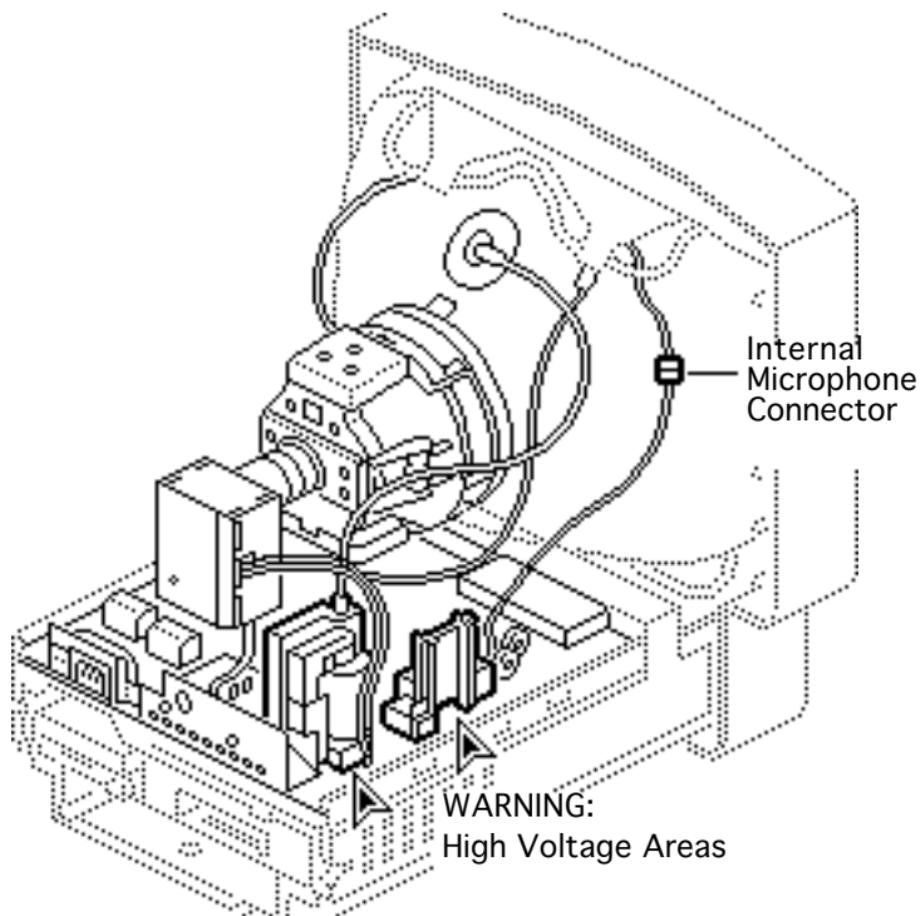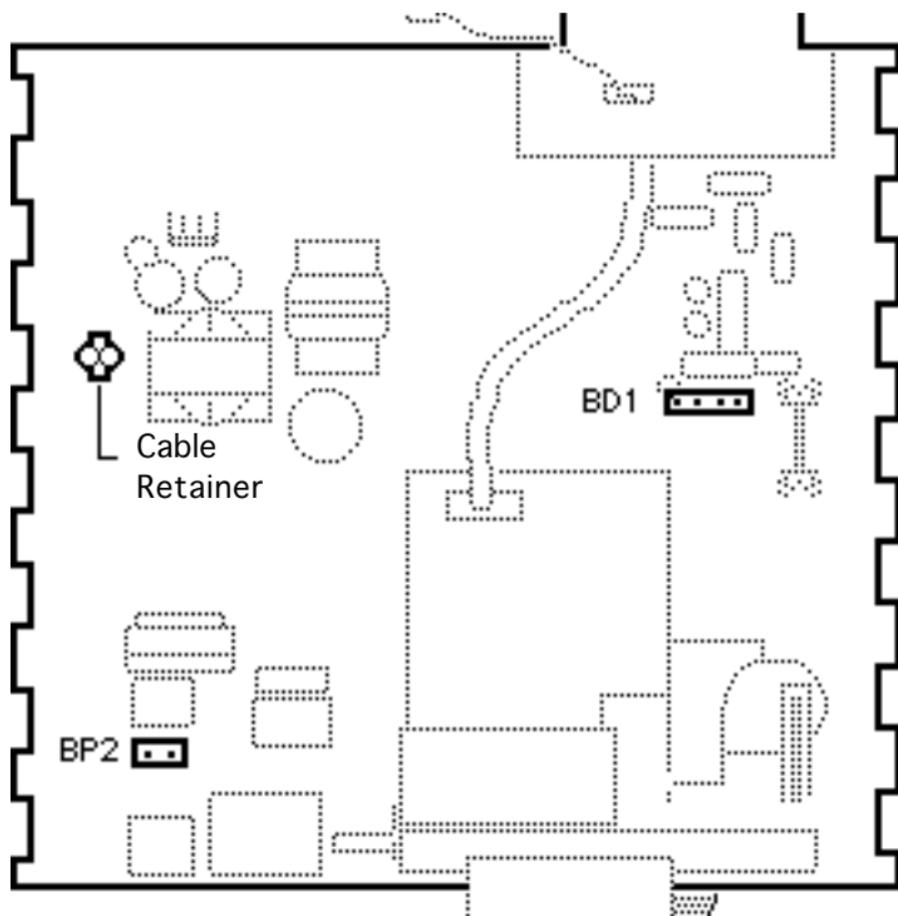
3   Disconnect the following
     cables from the analog
     board:
     • Degauss cable from
       BP2 (use a small
       screwdriver to
       release the latch)
     • CRT cable from BD1

4   Remove the wires from
     the cable retainer.

Replacement Note: If you
are replacing the analog
board, remove the cable
retainer and reinstall it on
the new board.
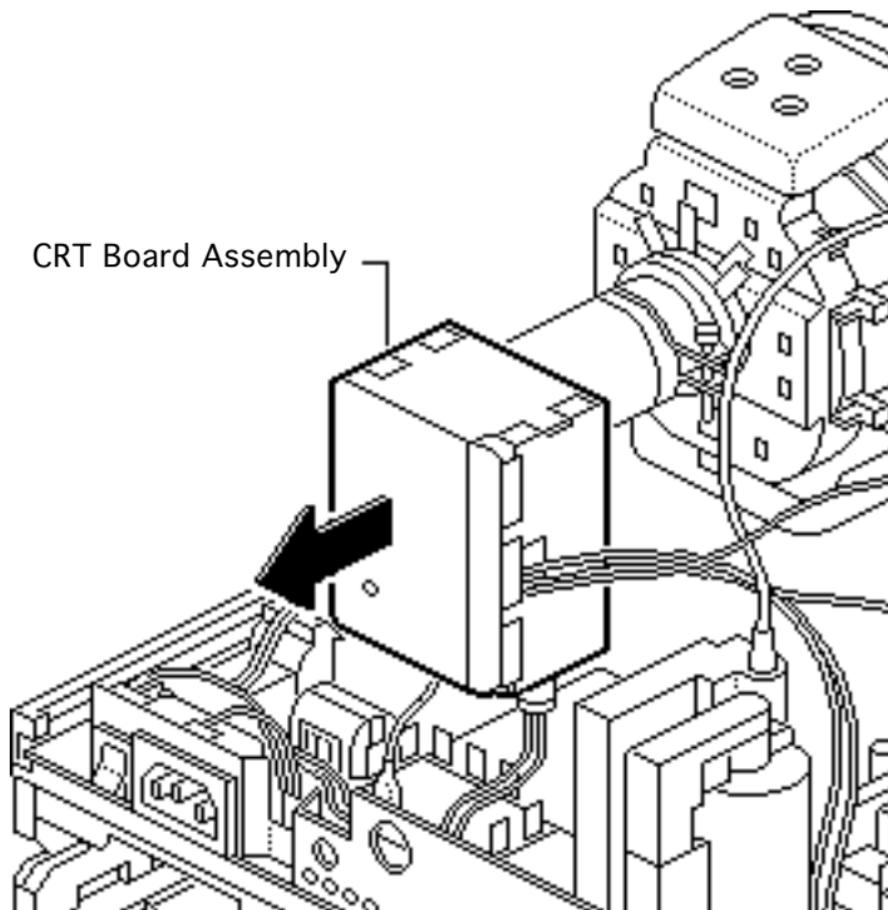
CRT Board Assembly

5   **Caution:** Twisting,
     bending, or applying
     force to the video board
     assembly could damage
     the neck of the CRT. Be
     sure to pull the CRT
     board assembly straight
     off the CRT.

     Remove the CRT board
     assembly from the neck
     of the CRT.
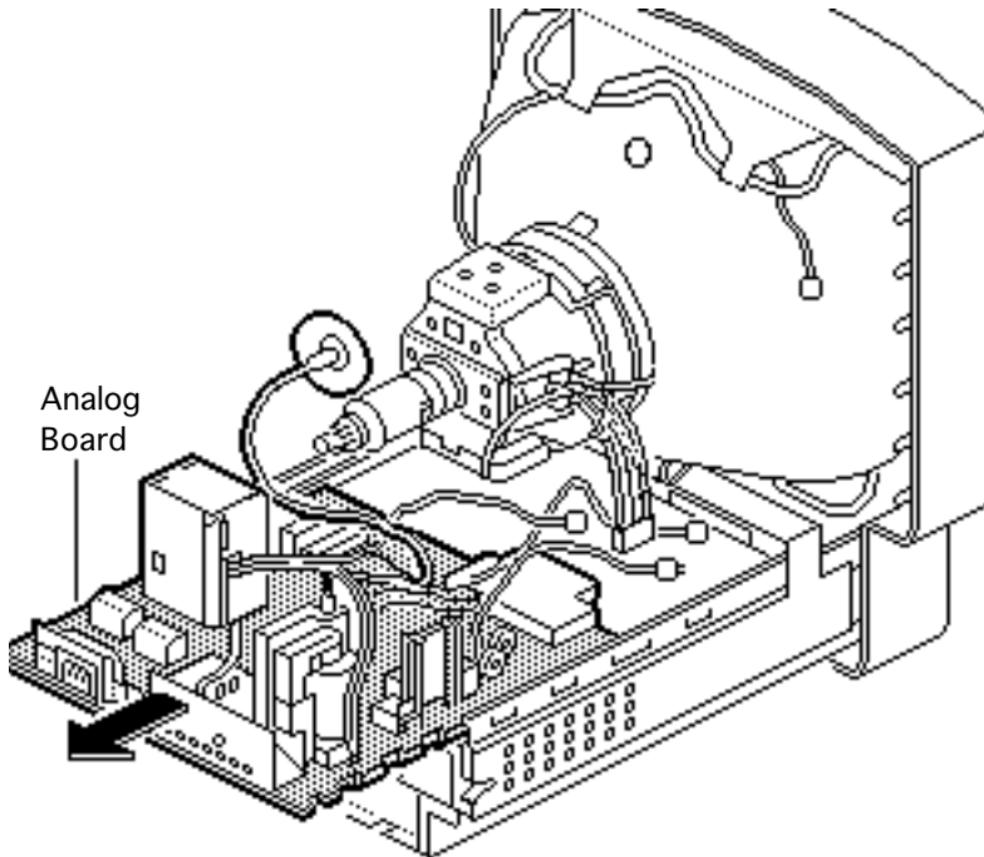
Analog
Board

6   Remove the analog board.

Replacement Note: Some analog boards may include a test jumper (located at BD 11). To avoid restart problems, remove this jumper from the existing or replacement analog board.

Replacement Note: Perform the cutoff adjustment whenever you replace the analog board. See "Video" in the Adjustments chapter.

I/O Door

No preliminary steps are required before you begin this procedure.

Caution: Review the ESD precautions in Bulletins/Safety.
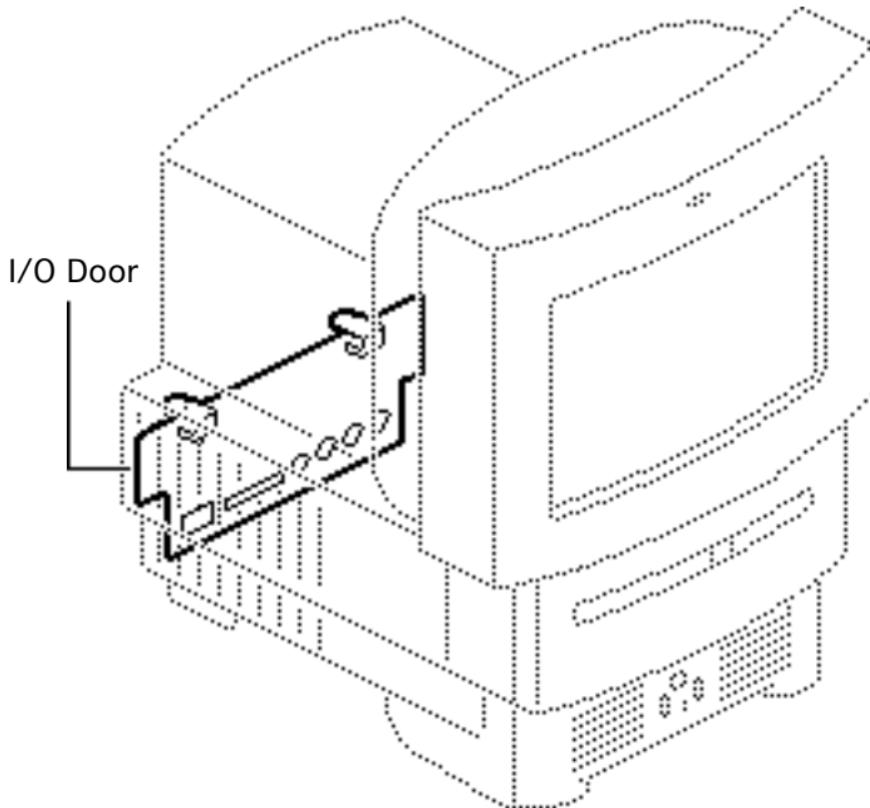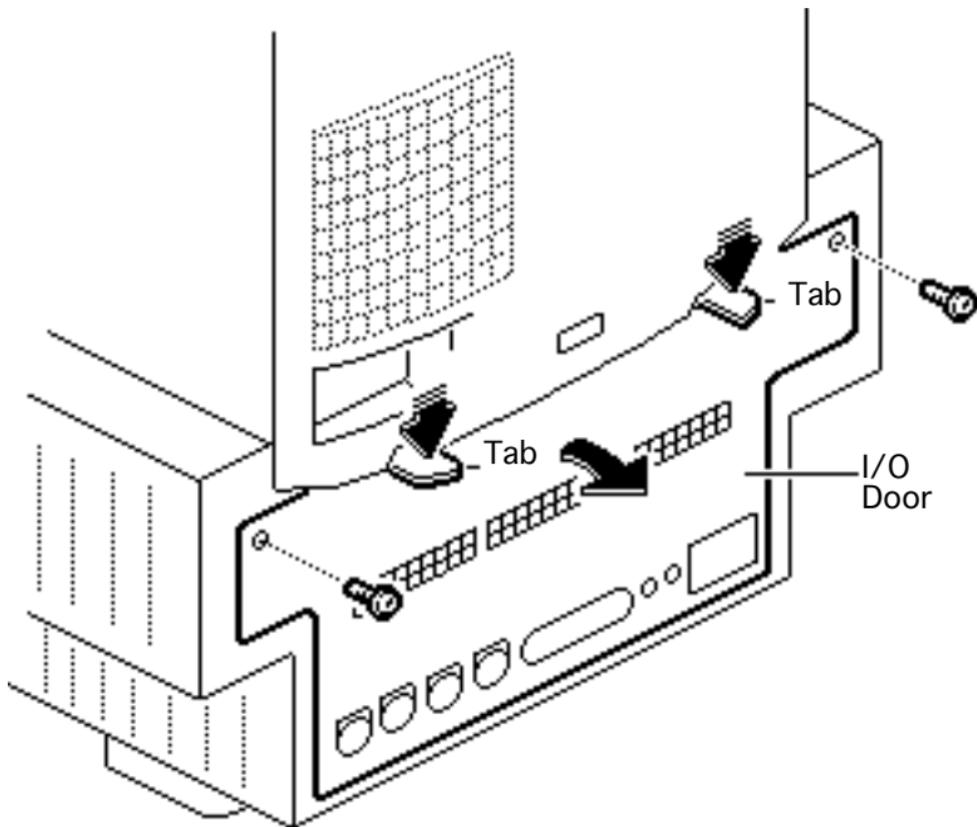
I/O Door

1 Remove the two screws.

2 Push down on the two tabs and remove the I/O door.

Tab

Tab

I/O Door

Logic Board

Logic Board

Before you begin, remove the I/O door.

Caution: You can access and remove the LC 520 logic board merely by removing the I/O door at the rear of the machine. Although upgrading the logic board is now extremely easy, do not neglect to follow proper ESD precautions: use a grounded workbench pad, and always wear a grounding wriststrap.
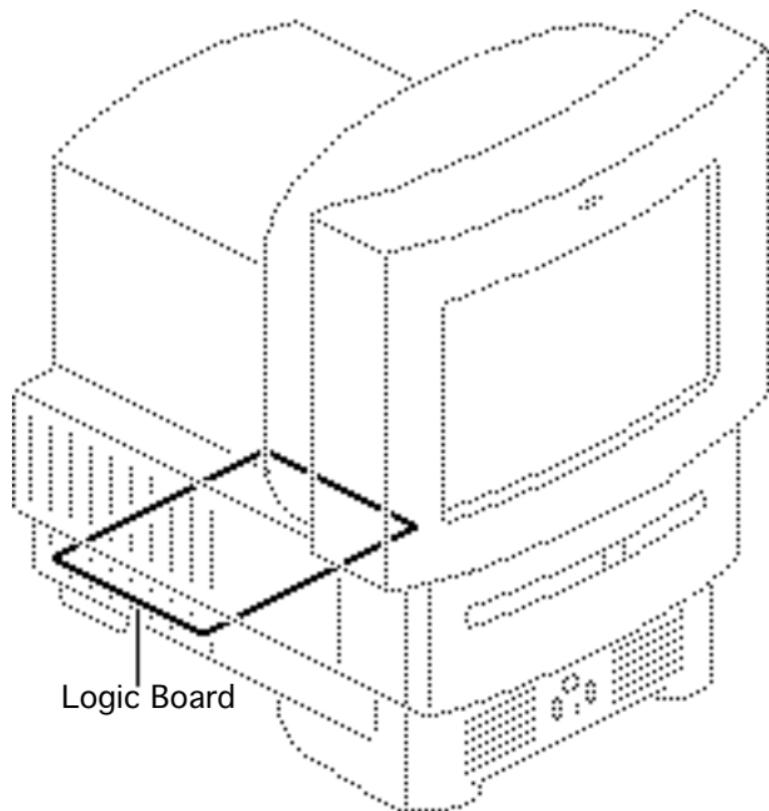
Pull out the logic board.

Logic
Board
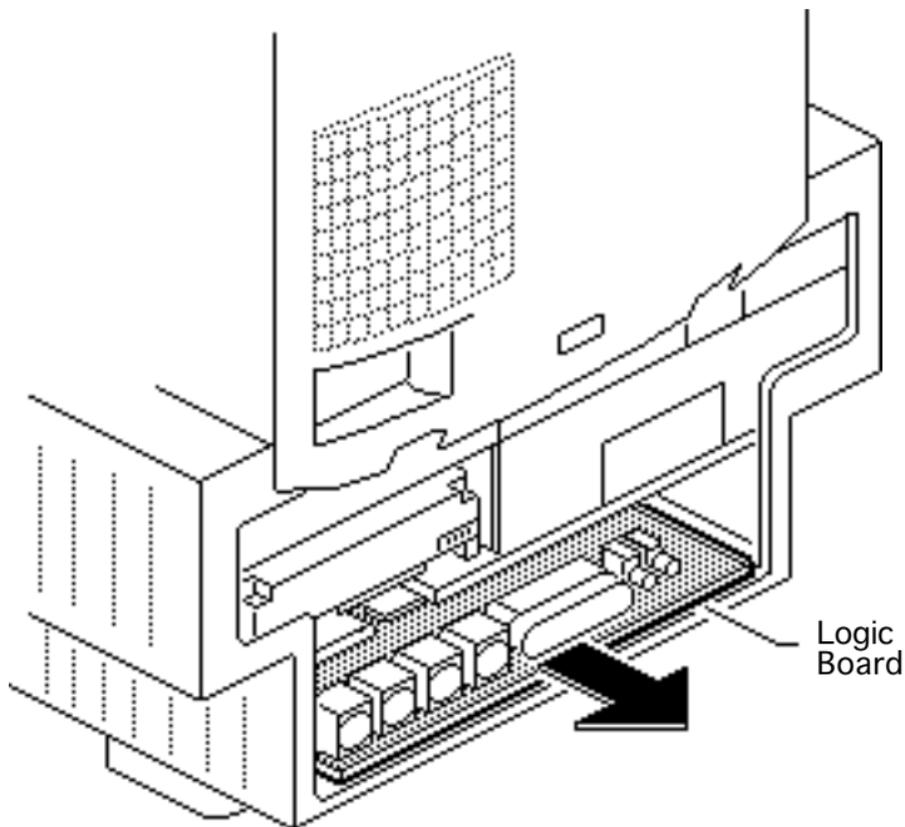
Drive Bezel

No preliminary steps are required before you begin this procedure.

Caution: Review the ESD precautions in Bulletins/ Safety.
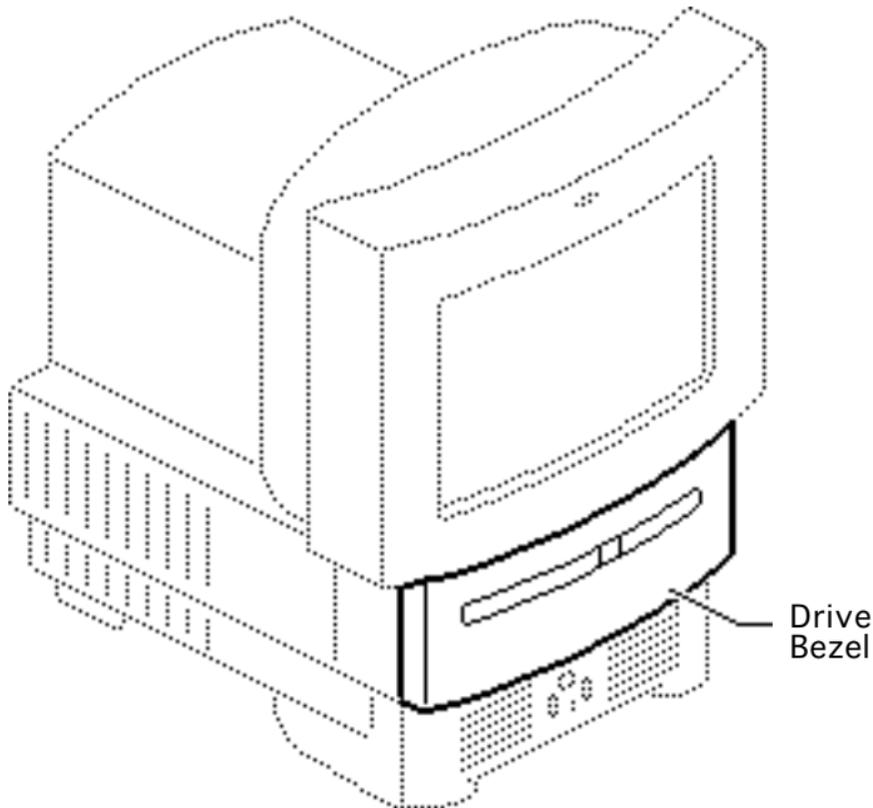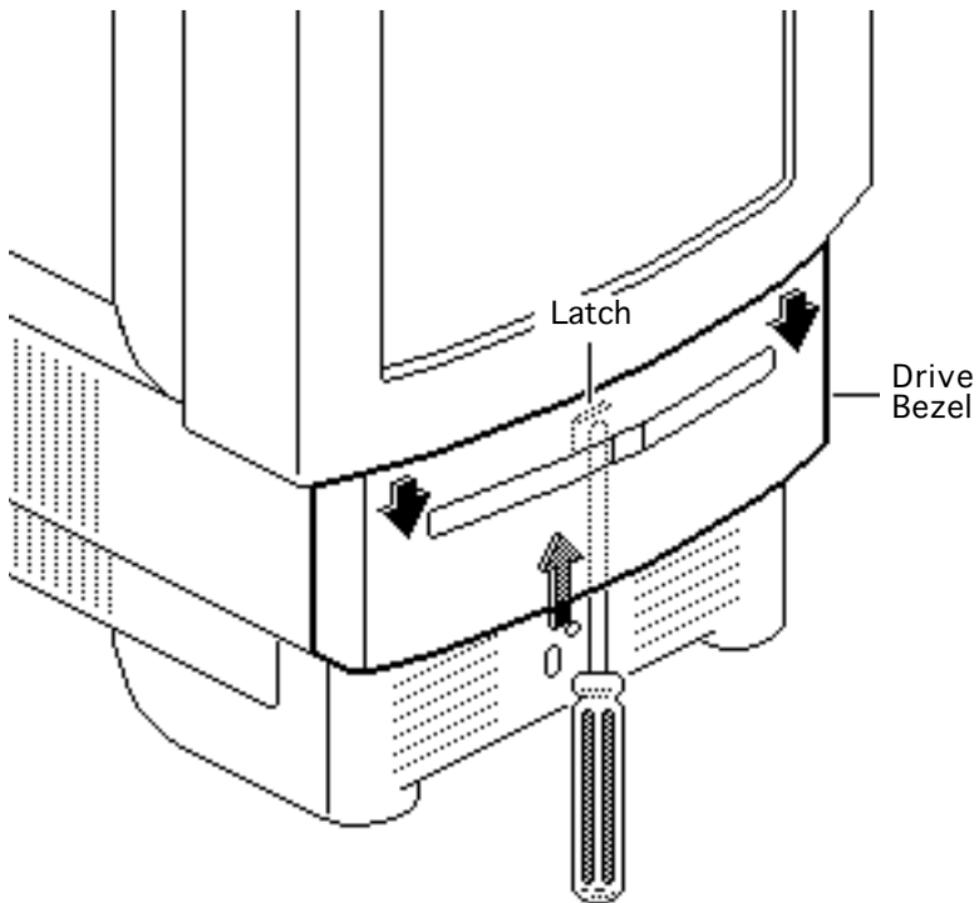
Drive Bezel

Using a flat-blade screwdriver, push up the latch. Pull down and remove the drive bezel.
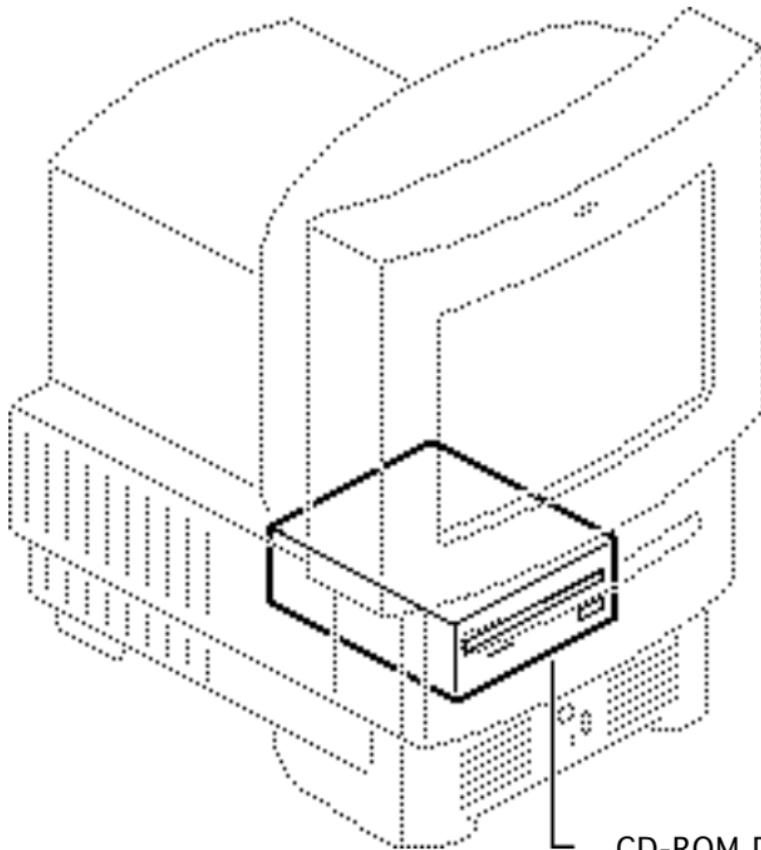
Latch

Drive Bezel

Floppy
Drive

Floppy Drive

Before you begin, remove the drive bezel.

Caution: You can access and remove the floppy drive merely by removing the drive bezel at the front of the machine. Although replacing the floppy drive is now extremely easy, do not neglect to follow proper ESD precautions: use a grounded workbench pad, and always wear a grounding wriststrap.
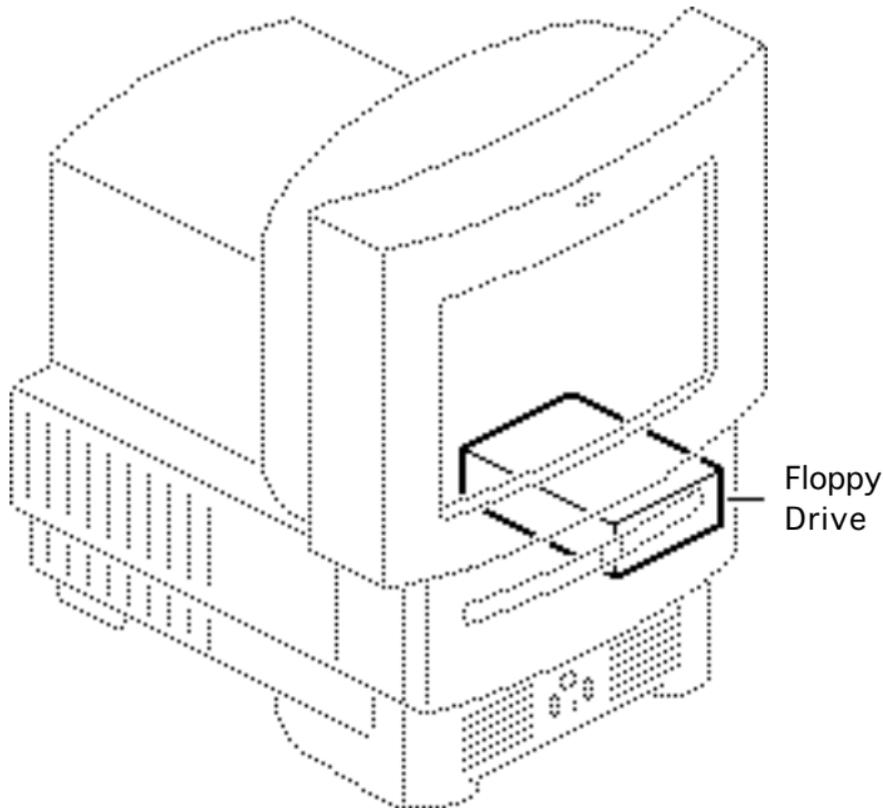
Note: The LC 520 includes an auto-inject 1.4 MB floppy drive and a chassis harness assembly that requires a floppy drive connector adapter. The LC 550 and 575 include manual-inject 1.4 MB floppy drives and chassis harness assemblies that allow the floppy drive cable to connect directly to the drive.

Push down the latch and pull out the floppy drive.

Floppy
Drive

Latch

Connector Adapter
(LC 520 Only)
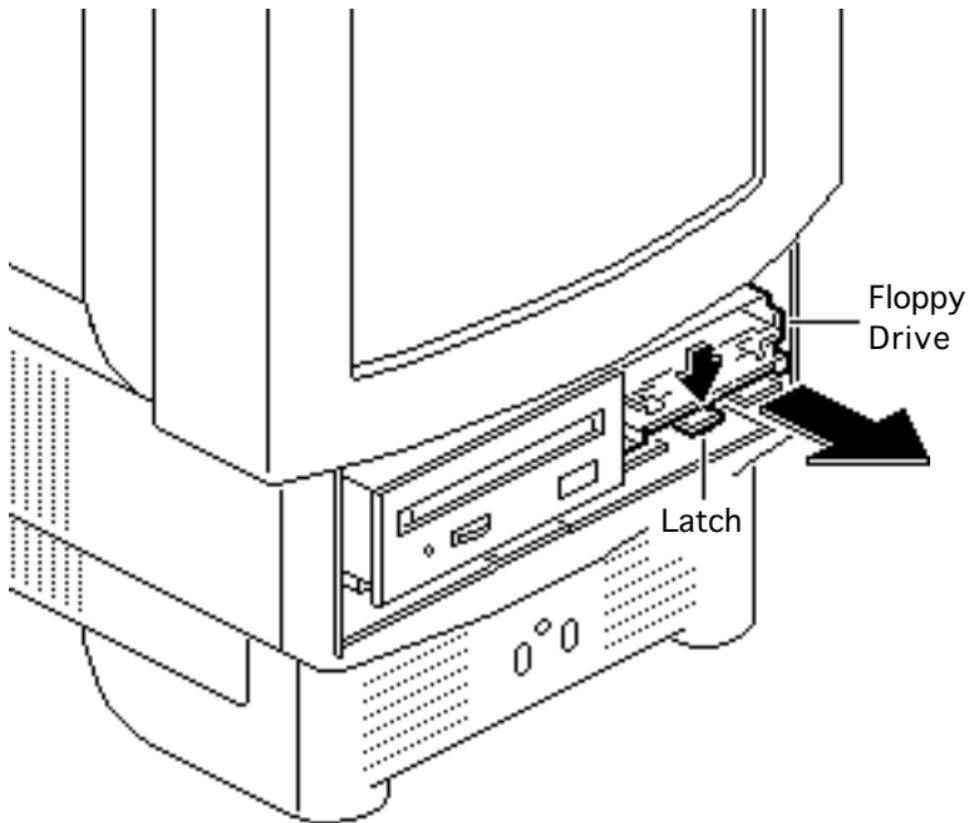
Macintosh LC 520 Auto-inject Floppy Drive
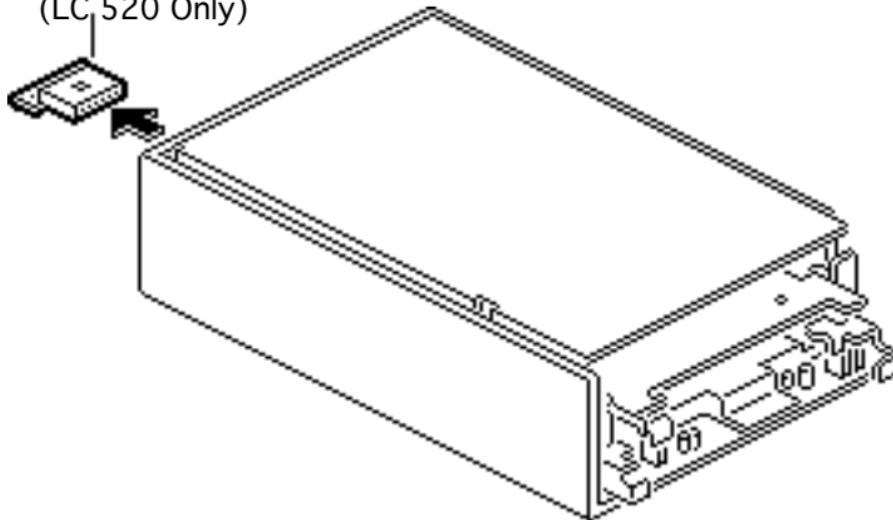
1 Pull out the floppy drive connector adapter

Replacement Note: Be sure to reinstall the floppy drive connector adapter on the replacement floppy drive.
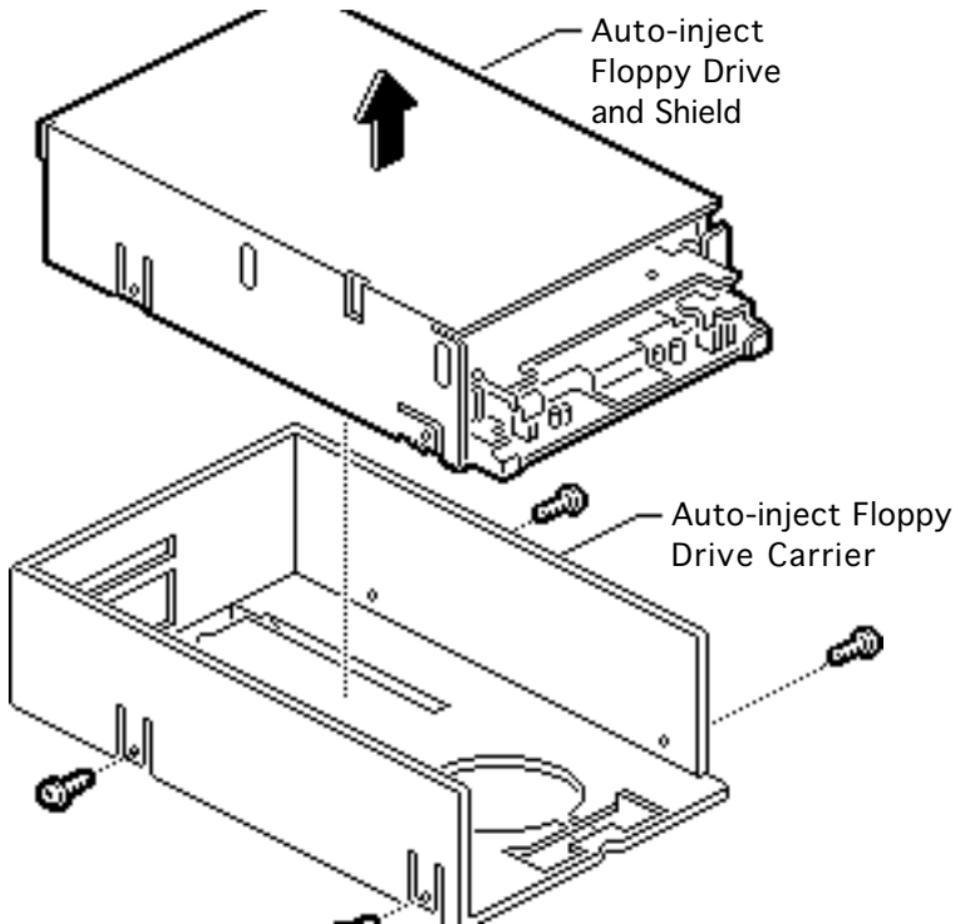
Auto-inject
Floppy Drive
and Shield

Auto-inject Floppy
Drive Carrier

2 Remove the four
mounting screws and
remove the floppy drive
from the carrier.

Auto-inject
Floppy Drive
Shield

Auto-inject
Floppy Drive
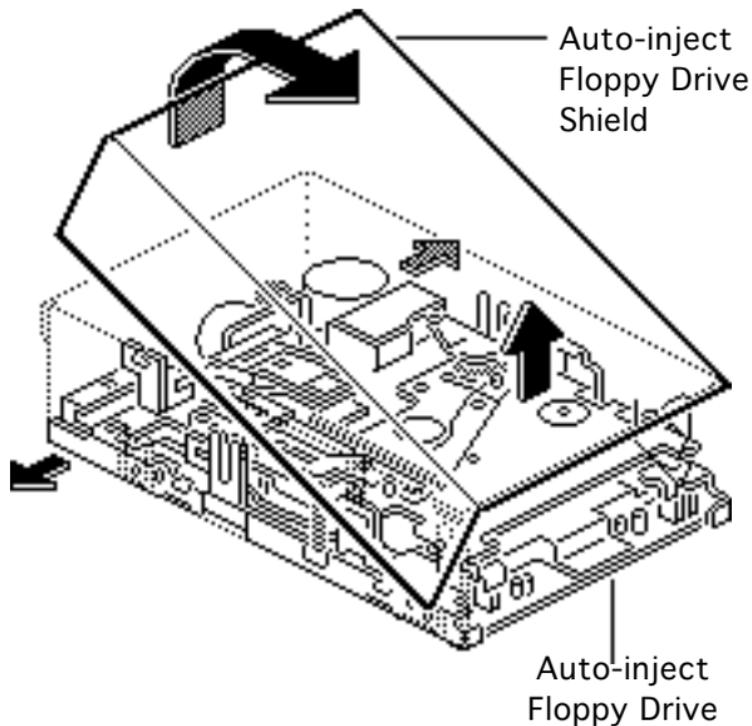
3   Pull out the sides of the
    floppy drive shield, lift
    the back of the shield,
    and remove it from the
    floppy drive.

Manual-Inject
Floppy Drive

Manual-inject
Floppy Drive
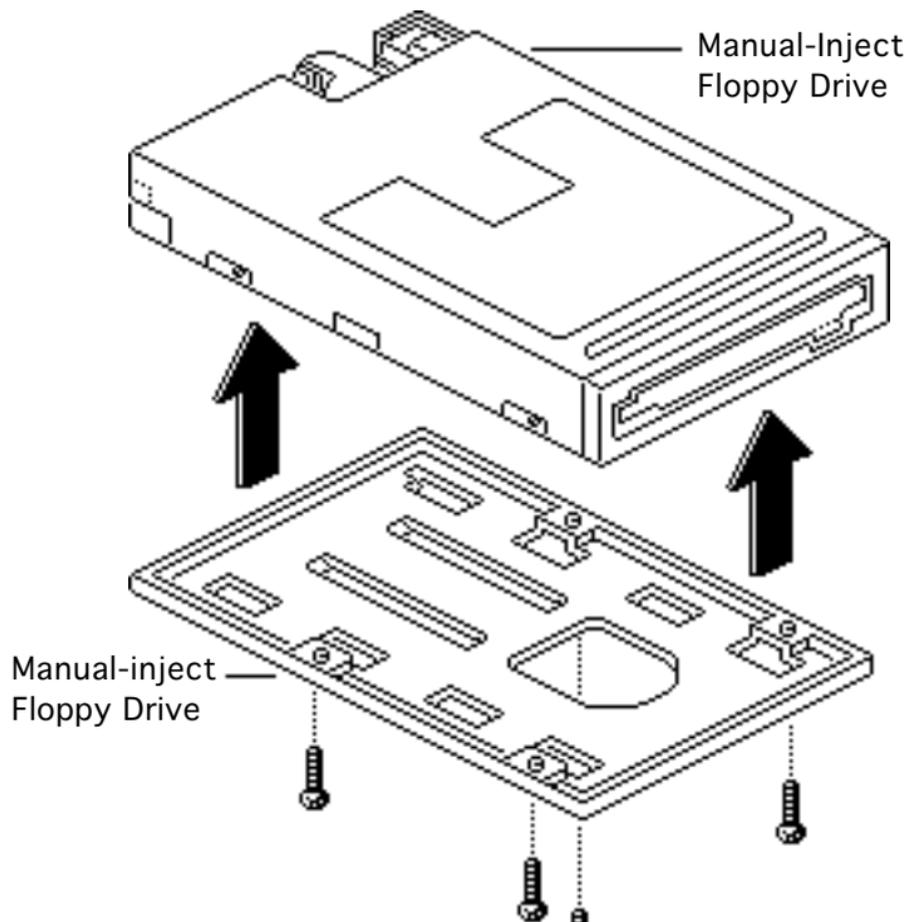
Macintosh LC 550 and 575 Manual-inject Floppy Drive

Remove the four mounting screws and remove the floppy drive from the carrier.

Note: Do not remove the metal case from the manual-insert floppy drive in the LC 550 and LC 575.

CD-ROM Drive

CD-ROM Drive

Before you begin, remove the drive bezel.

Caution: You can access and remove the CD-ROM drive merely by removing the drive bezel at the front of the machine. Although upgrading the CD-ROM drive is now extremely easy, do not neglect to follow proper ESD precautions: use a grounded workbench pad, and always wear a grounding wriststrap.
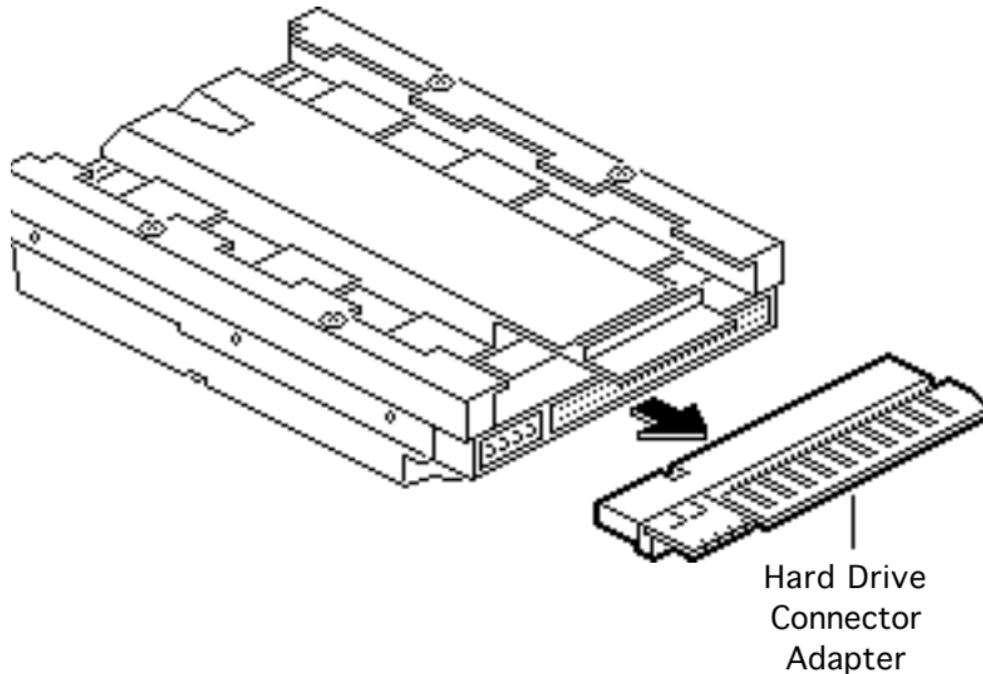
CD-ROM
Drive
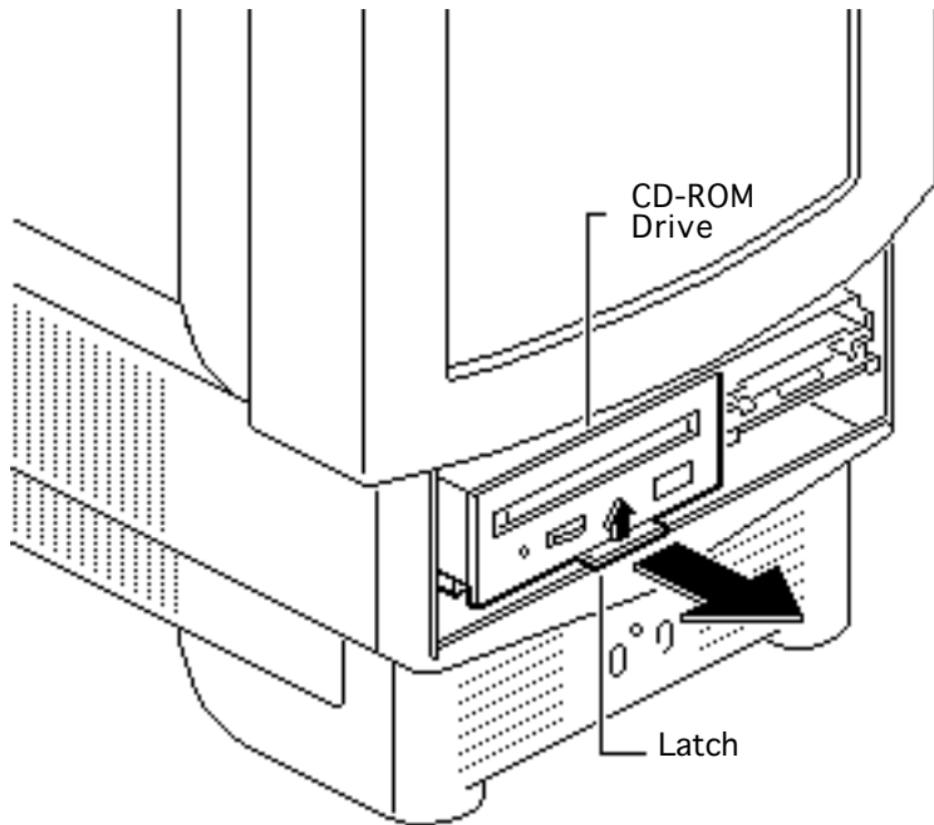
Latch

1 Pull up the latch and pull out the CD-ROM drive.

2 Pull out the CD connector adapter and the CD audio adapter.

Replacement Note: Be sure to reinstall the CD connector adapter on the replacement CD-ROM drive.

CD Connector or Hard Drive Adapter
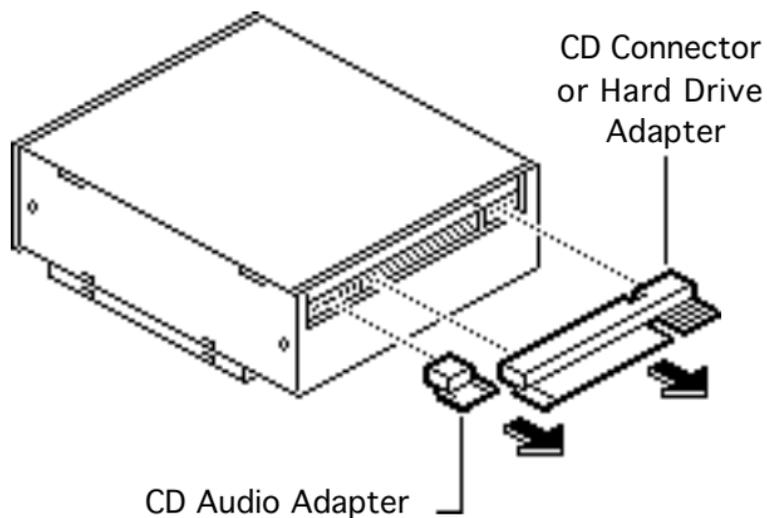
CD Audio Adapter

Replacement Note: Be sure to reinstall the correct drive connector adapter and CD audio adapter. The adapters used for the LC 520 and LC 575 are very similar, but are not interchangeable. The bases of the LC 520 adapters are shorter than the bases of the LC 575 adapters.
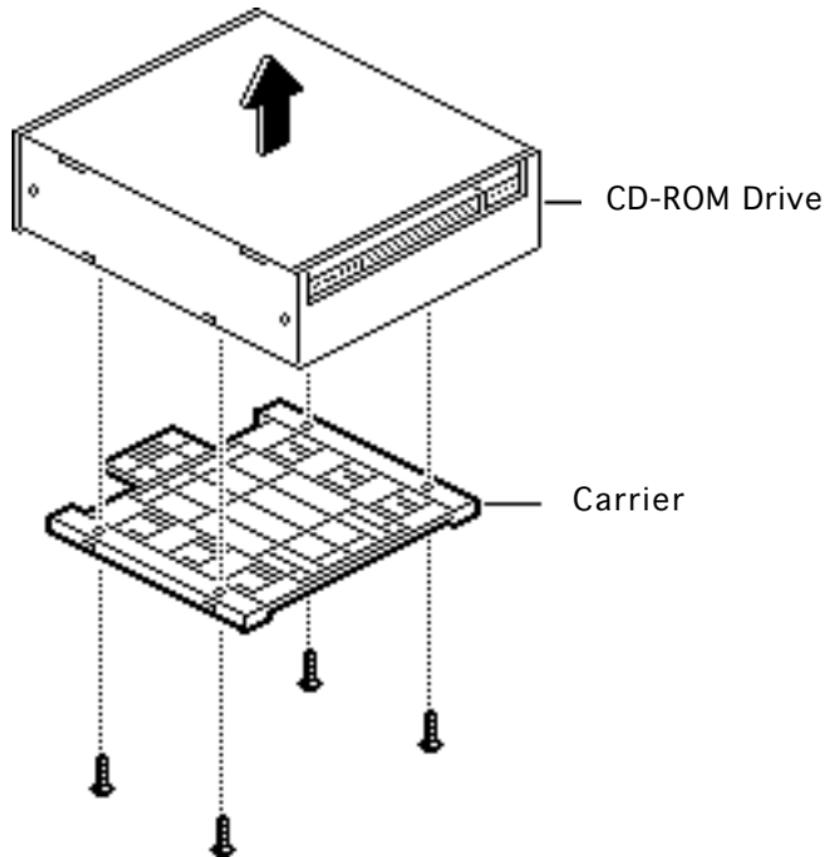
3 Remove the four
mounting screws and
remove the CD-ROM
drive from the carrier.

Replacement Note: Replace
the carrier on the new CD-
ROM drive.

CD-ROM Drive

Carrier

Hard Drive

Hard Drive

Before you begin, remove the I/O door.

Caution: You can access and remove the LC 520 hard drive merely by removing the I/O door at the rear of the machine. Although upgrading the hard drive is now extremely easy, do not neglect to follow proper ESD precautions: use a grounded workbench pad, and always wear a grounding wriststrap.
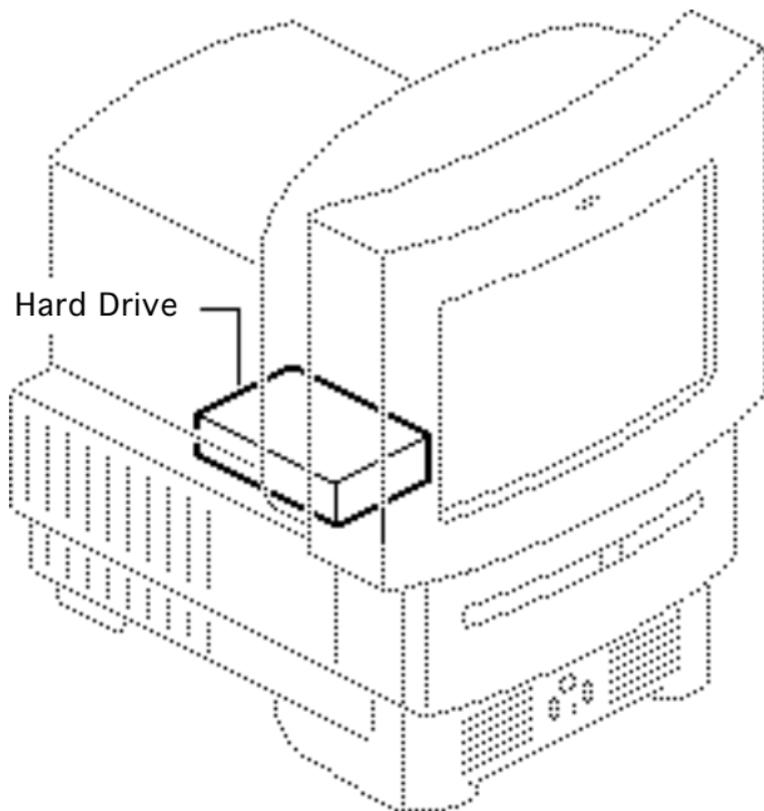
1 Push down the latch and
   remove the hard drive.

Hard Drive

Latch
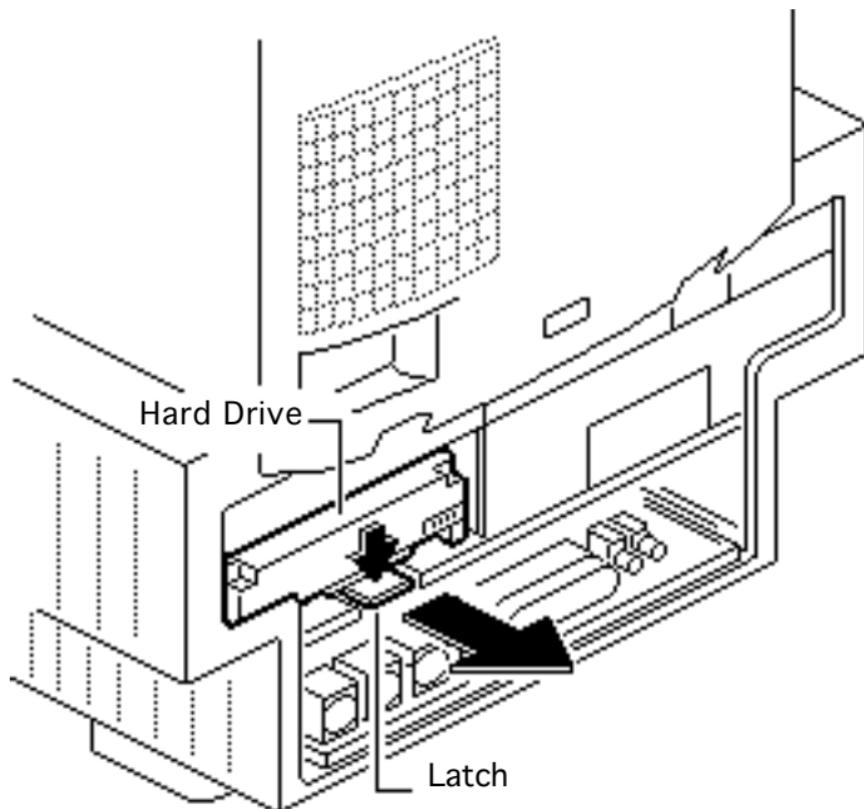
2 Pull out the hard drive connector adapter.

Replacement Note: Be sure to reinstall the hard drive connector adapter on the replacement hard drive.

Hard Drive
Connector
Adapter
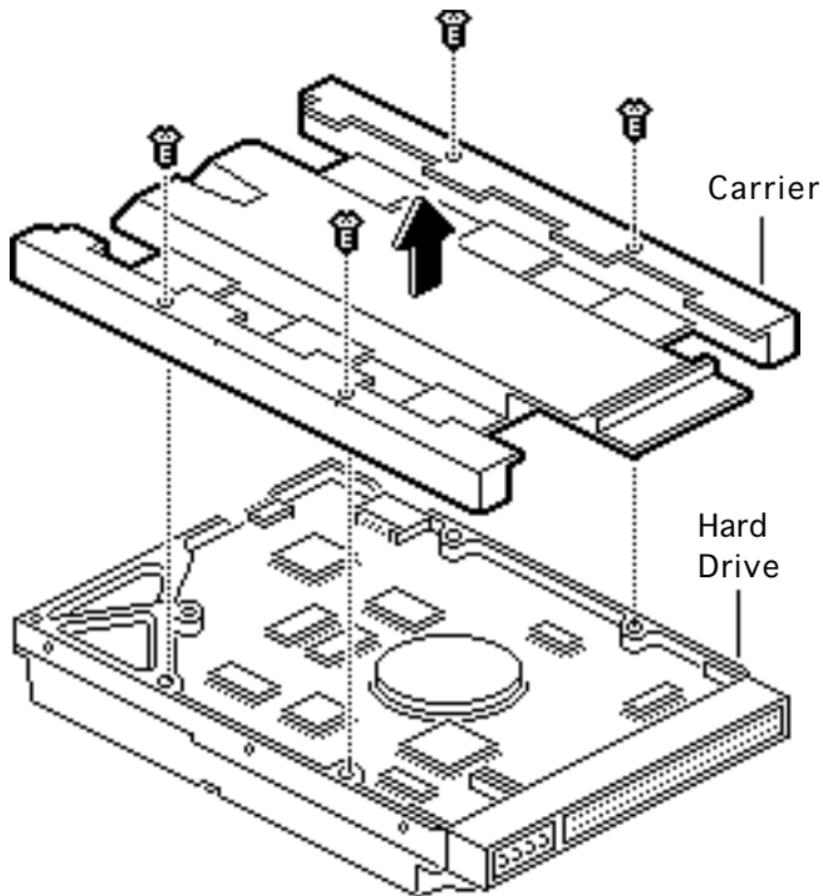
3   Remove the four screws.

4   Remove the hard drive from the carrier.

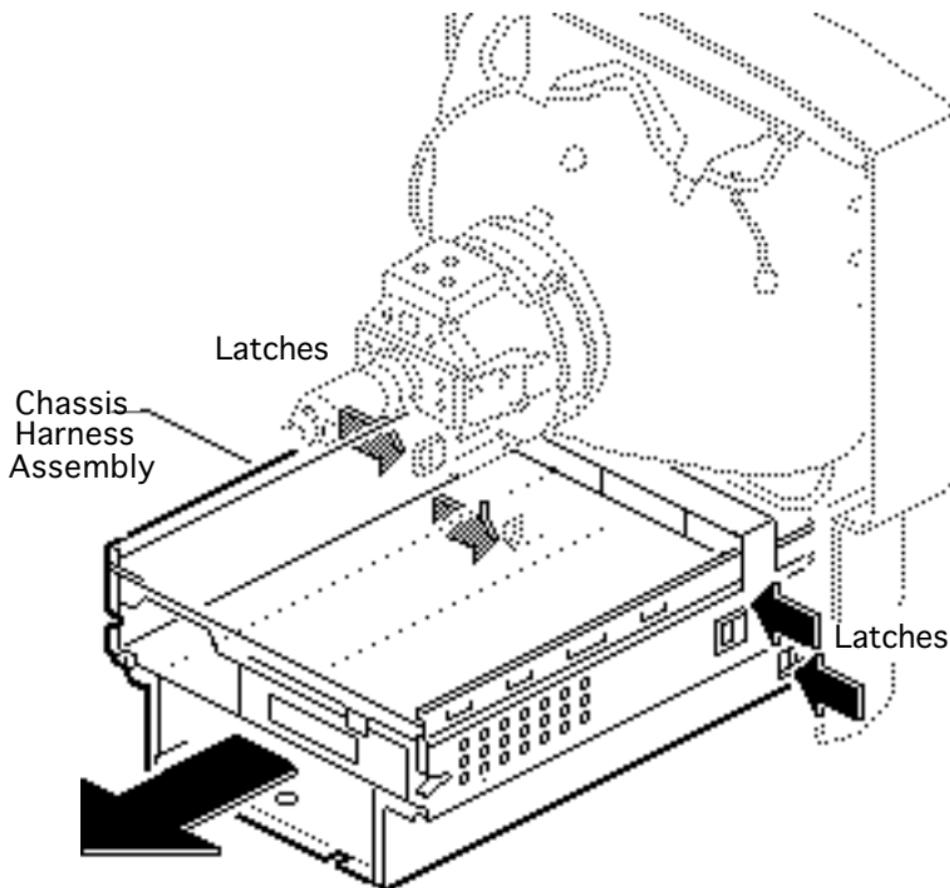**Replacement Note:** Replace the carrier on the new hard drive.

Carrier

Hard Drive

Chassis Harness
Assembly

Chassis Harness Assembly

Before you begin, remove
the following:

- Drive bezel
- I/O door
- CD-ROM drive
- Floppy drive
- Hard drive
- Logic board
- Rear housing
- Analog board
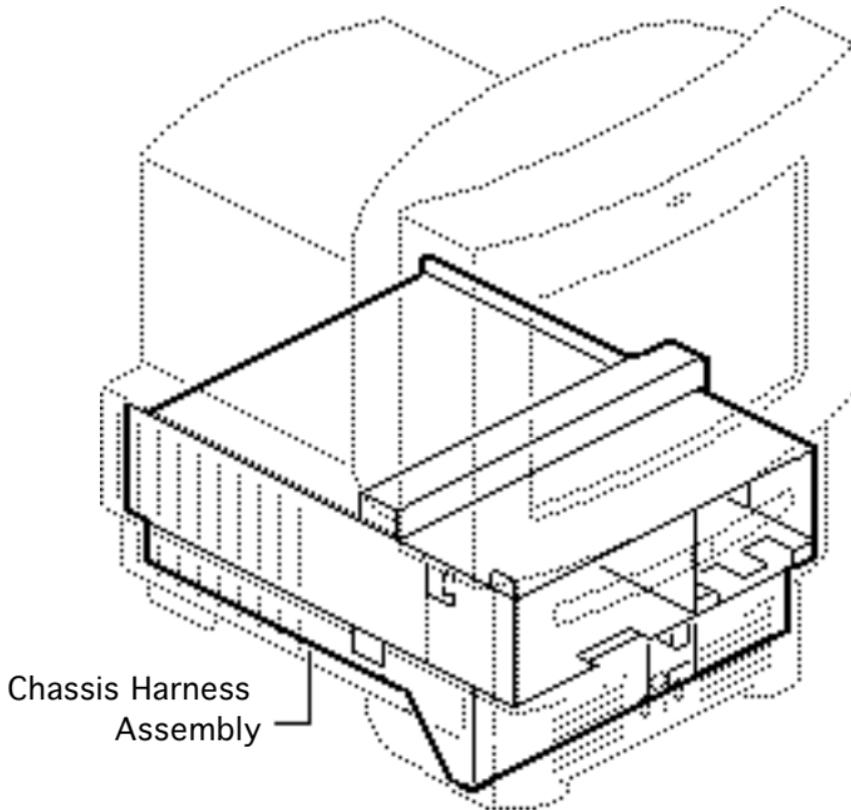
Latches

Chassis
Harness
Assembly

Latches

Warning: This product contains high voltage and a high-vacuum picture tube. To prevent serious personal injury or equipment damage, review CRT safety in Bulletins/Safety.

Warning: Never use a grounding wriststrap until after discharging the CRT.

1 Discharge the CRT.

2 Press in the four latches and lift off the chassis harness assembly.

Chassis Harness Take Apart Strategy

Background

After product introduction, Apple Service adjusted the service strategy for the chassis harness assembly in Mac TV, LC 500 Series, and Performa 500 Series computers. Originally, the chassis harness assembly was a single service assembly. As of November 1994, the chassis harness assembly is divided into several service piece parts.

Identifying the Chassis Harness Assembly

There are three slightly different chassis harness assemblies and Apple service strategy varies with the type of chassis.   The three chassis harness assemblies differ according to the combination of floppy and CD-ROM drives they support.

- Chassis 922-1824 supports the auto-insert Apple SuperDrive and CD-ROM drives earlier than the 300i+. This chassis requires a floppy drive adapter, and the CD-ROM connector bridge is about 1-1/2 inches above the CD-ROM drive bay.

- Chassis 922-0557 supports the manual-insert Apple SuperDrive and CD-ROM drives earlier than the 300i+. This chassis uses a ribbon cable to connect the floppy drive, and the CD-ROM connector bridge is about 1-1/2 inches above the CD-ROM drive bay.

- Chassis 661-1094 supports the manual-insert Apple SuperDrive and the 300i+ CD-ROM drive. This chassis uses a ribbon cable to connect the floppy drive, but the CD-ROM connector bridge is only 1/2 inch above the CD-ROM drive bay.

For more information, refer to *Apple Service Guide*, Macintosh Computers, Vol. 3 (1994), page 110.

Service Parts Now Available for Chassis 922-1824 and 922-0557

661-0981 Shield Kit (EMI shielding)

922-1825 PCBA Front Panel (front panel control board)

922-1826 Speaker Assembly (speaker and wire)

922-0117 Screw

076-0489 Chassis Kit (bare chassis)

922-0503 FoxConn Cable Assembly (logic board connector and cable assembly)

Service Parts Now Available for Chassis 661-1094

661-0981 Shield Kit (EMI shielding)

922-1825 PCBA Front Panel (front panel control board)

922-1826 Speaker Assembly (speaker and wire)

922-0117 Screw

Chassis Harness Take Apart Procedures

First remove the chassis harness assembly.

EMI Shields

1 Remove the EMI shields in this order: lower shield, front drive and speaker shield, top panel shield.

2 Remove the front panel control board shield if it is present.

Cable Bridge

Left Speaker Connection

Right Speaker Connection

Right Speaker

Control Panel Board

Control Panel Connector

Left Speaker

Speaker Assembly

First remove the EMI shields.

Caution: The speaker wire connections on the chassis cable bridge are very fragile. Avoid removing or replacing the speaker wires unless you need to replace the chassis or have isolated the problem to the speaker wires. (That is, replace and test the speakers, front panel control board, and analog board first.)
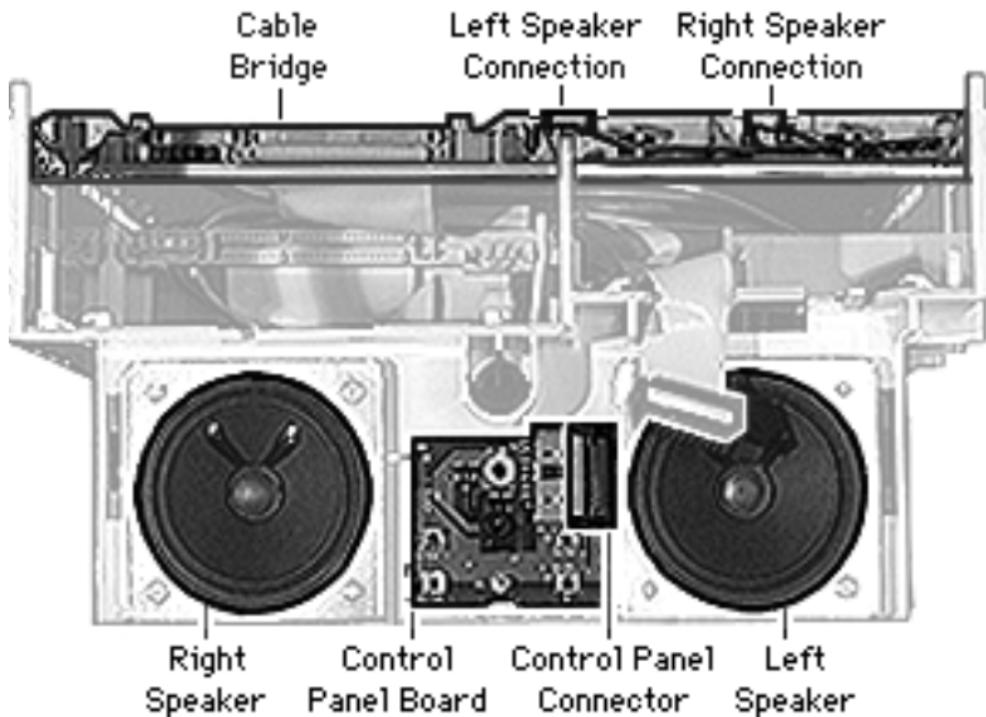
1   Disconnect the speaker wire spade connector from the back of the speaker.

2   Remove the Phillips screws from the front of the speaker.

Replacement Note: Detach the replacement speaker from its wires and connect the replacement speaker to the original speaker wires.

Speaker Wires

Note: The speaker wire connectors are very fragile.

1   Look down on the chassis cable bridge and locate the notches in the cable bridge on top of the wire connectors.

2   Using a jeweler's screwdriver, very gently press down on the tab in the middle of the wire connector. You will feel or hear a snap.

3   Slide out the wire connector.

Replacement Note: The analog board slides into the computer and completes the connection to the speaker wires; thus, the speaker wire connectors must sit securely in the cable bridge.

4   Slide the speaker wire connector into its position in the cable bridge and press up until the connector is secure. You may need to use a jeweler's screw driver to adjust the small metal tab in the center of the speaker wire connector.

Cable Bridge

Left Speaker Connection

Right Speaker Connection

Right Speaker

Control Panel Board

Control Panel Connector

Left Speaker

Front Panel Control Board

First remove the EMI shields.

1 Disconnect the front panel control cable.

2 Remove the Phillips screw and remove the board.
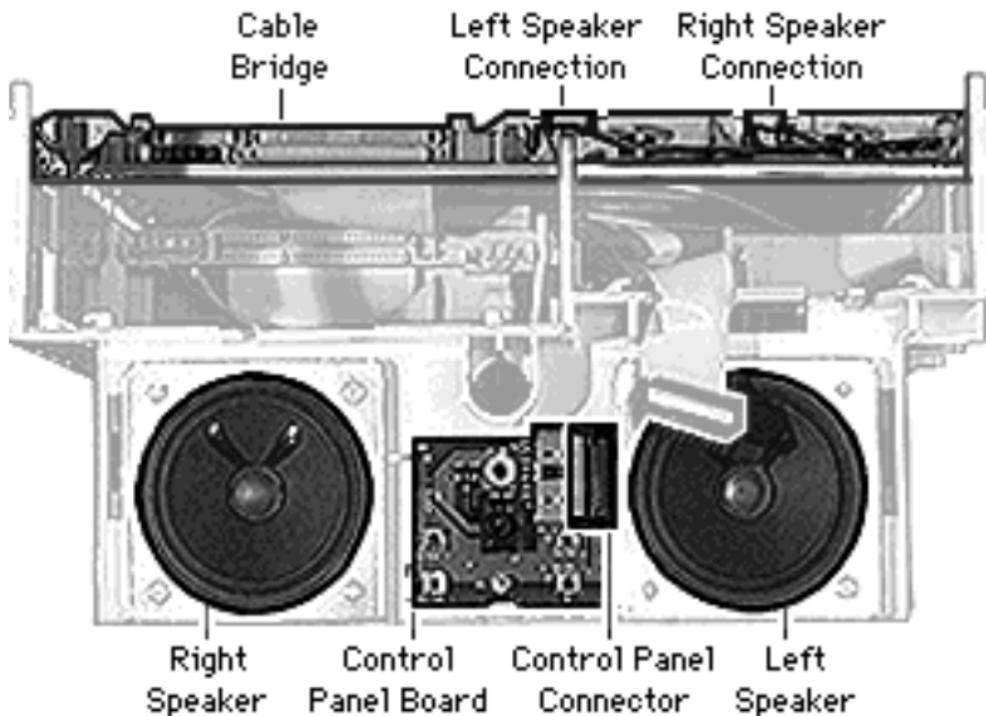
Logic Board Connector and Cable Assembly

First remove the EMI shields, speaker assembly, and front panel control board.

Overview of removal procedures (Detailed steps follow the overview.)

First disconnect all the connections from the top of the chassis. Then route the cables through to the underside of the chassis and disconnect the logic board connector.

CD-ROM Connector

Analog Board Connector

Bridge Cable

Hard Drive Connector

Left Speaker Cable Connector

Right Speaker Cable Connector

Floppy Drive Connector
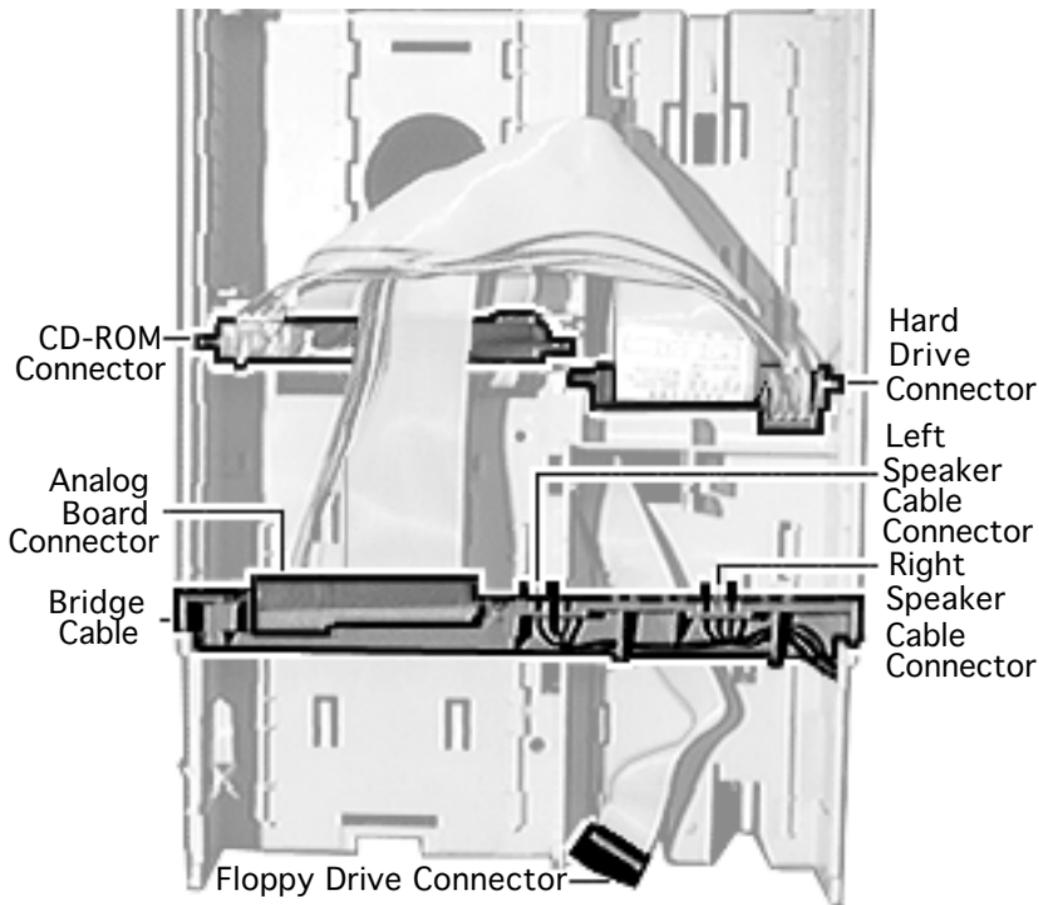
1 Stand at the front of the chassis, looking down at the top of the chassis, and disconnect the following in the order listed: analog board connector, CD-ROM drive connector, and hard drive connector. (The connector tabs operate much like large-scale SIMM slot connectors on logic boards.)

2   Route the analog board and the CD-ROM/hard drive
    cables through the large square hole behind the CD-ROM
    drive bay.

3   Push the floppy drive cable (if present) and front panel
    control cable to the underside of the chassis.

4   Turn the chassis over and stand at the rear of the chassis.

5   Release the three tabs from the sides and center of the
    logic board connector and remove the logic board
    connector and cable assembly.

Overview of replacement procedures (Detailed steps follow the overview.)

Connect the logic board connector to the underside of the chassis, route the cables through the appropriate openings, and connect the connectors on the top and front of the chassis. After replacing the logic board connector and cable assembly, replace the speakers, front panel control board, and EMI shields.

1   Place the chassis with the underside facing up and the speakers facing away from you.

Control Panel Cable

Analog Board Connector

Floppy Drive Cable

Logic Board Connector

CD-ROM Drive Cable/ Hard Drive Cable
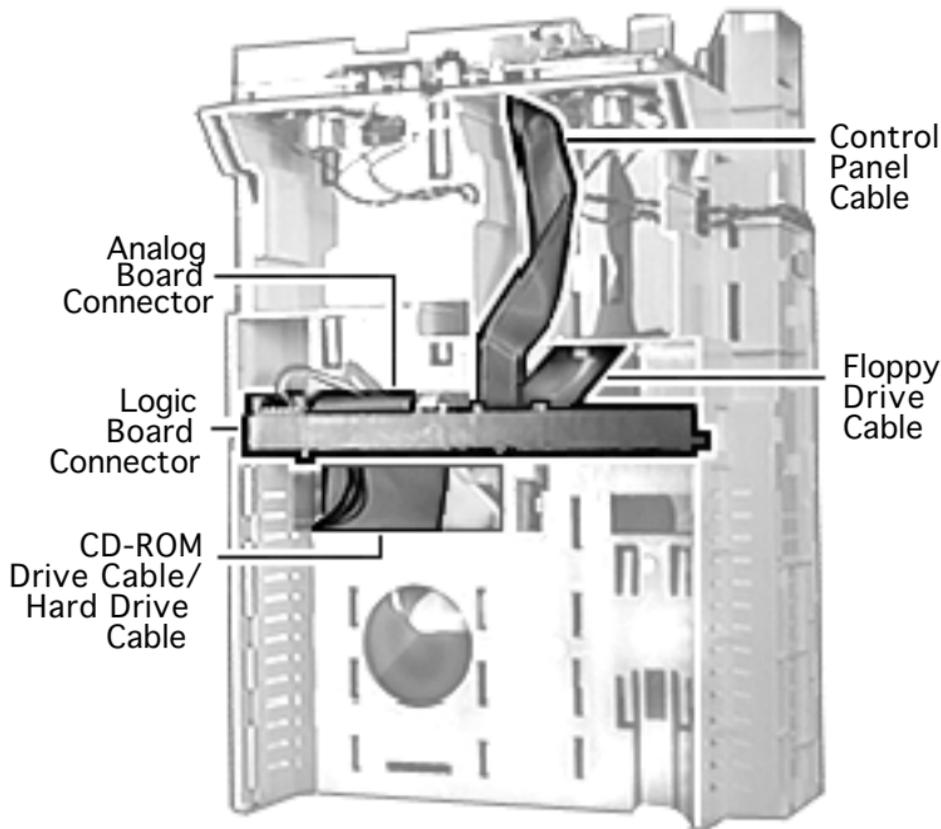
2 Arrange the logic board connector and cable assembly as shown.

3 Face the connector slot of the logic board connector toward the rear and from the back of the connector route the CD-ROM/hard drive, analog, and floppy drive cables under the connector. Extend the control panel connector cable from the back of the logic board connector toward the front of the chassis.

Control Panel Connector

Logic Board Connector

CD-ROM Drive Connector

Floppy Drive Connector

Analog Board Connector

Hard Drive Connector
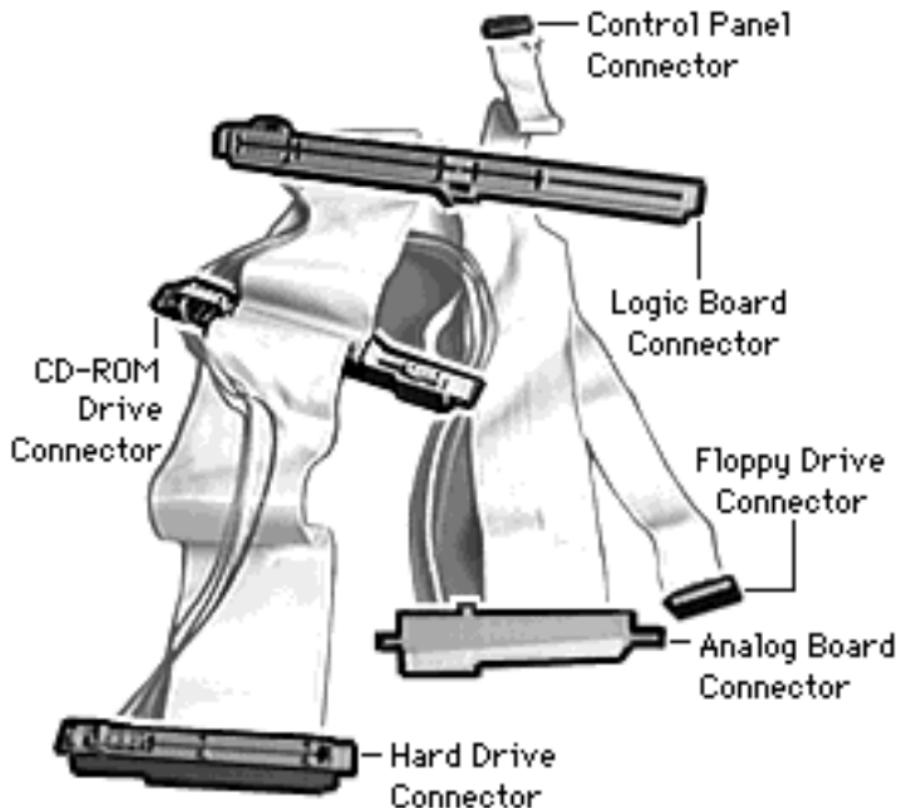
Logic Board Connector and Cable Assembly

1 Slide the side extension of the logic board connector down the front side of the small keyed tabs. The logic board connector will snap into place.

   Note: Be sure the center tab snaps into place at the same time.

2 Route the front panel control cable through the hole in the front of the chassis

3   Route the floppy drive cable through its opening at the back of the floppy drive bay.

4   Carefully route the analog and CD-ROM/hard drive cables through the large opening behind the CD-ROM drive bay

5   Turn over the chassis so that the top is up and the speakers are at the front, facing you.

Important: Be sure to reconnect the CD-ROM, hard drive, and analog connectors in the proper order. When you position the CD-ROM, hard drive, and analog connectors, be sure that the power cables are placed toward the outside of the chassis and the data ribbon cables are placed toward the inside of the chassis.

6   Locate the CD-ROM, hard drive, and analog connectors.

7   Position the CD-ROM connector with the connector slot

facing the front of the chassis and the power cables facing toward the outside edge of the chassis. Slip the connector extension through the slot in the side of the chassis and slide the connector into place.

8   Position the hard drive connector with the connector slot facing the rear of the chassis and the power cables facing toward the outside edge of the chassis. Slip the connector extension through the slot in the side of the chassis and slide the connector into place.

9   Position the analog board connector with the connector slot facing the rear and the power cables facing toward the outside edge of the chassis. You will have to route the cable under the connector (between the connector and the cable bridge). Slightly push forward one of the keyed tabs and slide the connector into place.

10 To replace the speakers, front control panel board, and EMI shields, reverse the take-apart procedures above. Pay attention to the caution regarding the fragility of the speaker wire connectors and their replacement procedures.
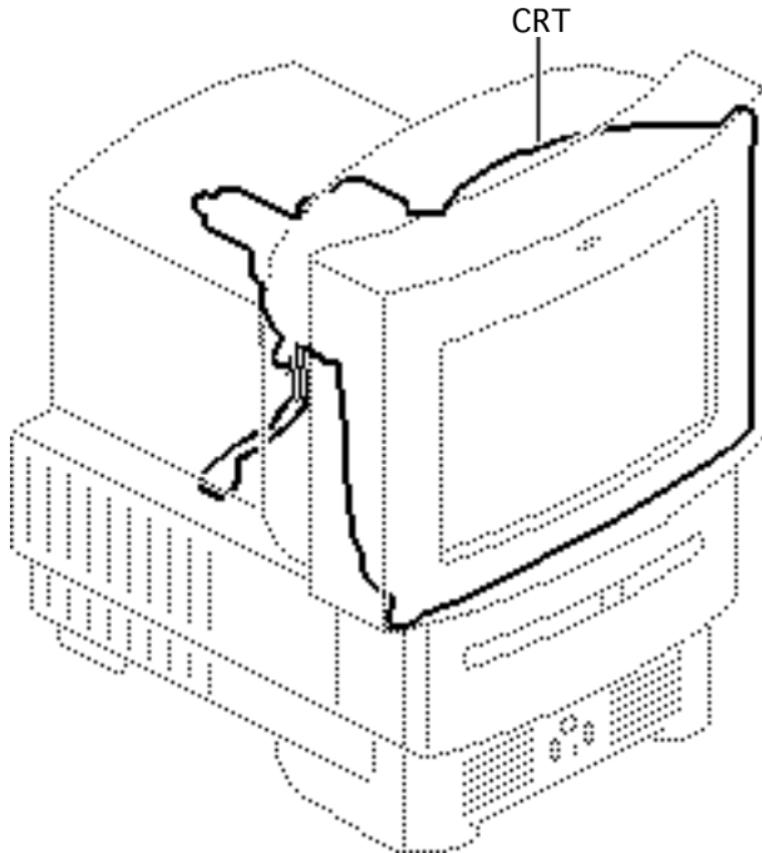
CRT

CRT

Before you begin, remove the following:

- Drive bezel
- I/O door
- CD-ROM drive
- Floppy drive
- Hard drive
- Logic board
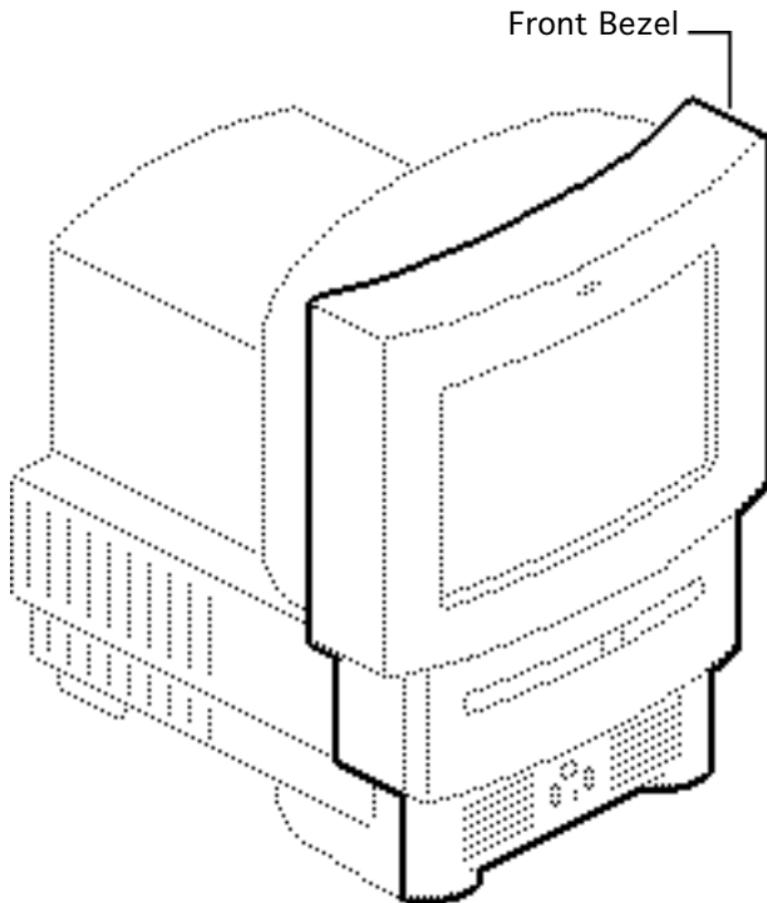- Rear cover
- Analog board
- Chassis harness assembly

Mounting Screws

Degauss Panel

Degauss Panel
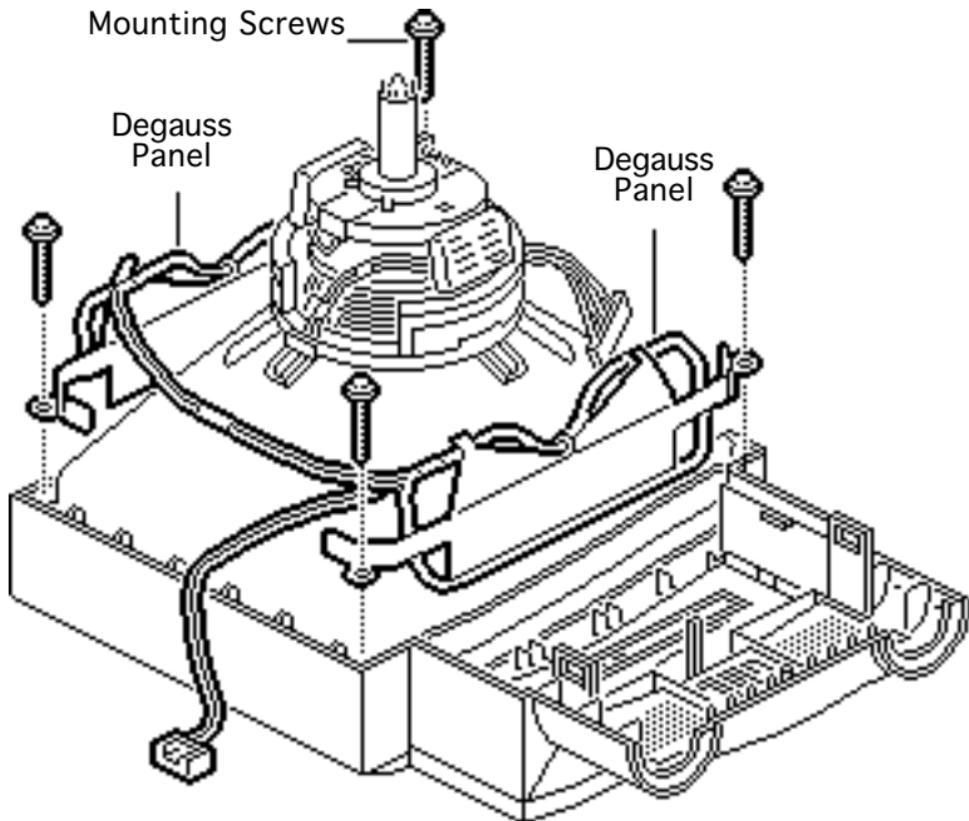
■**Warning:** This product contains high voltage and a high-vacuum picture tube. To prevent serious injury, review CRT safety in Bulletins/Safety.

■**Warning:** Never use a grounding wriststrap until after discharging the CRT.

1 Remove the four mounting screws and lift off the two degauss panels.

CRT
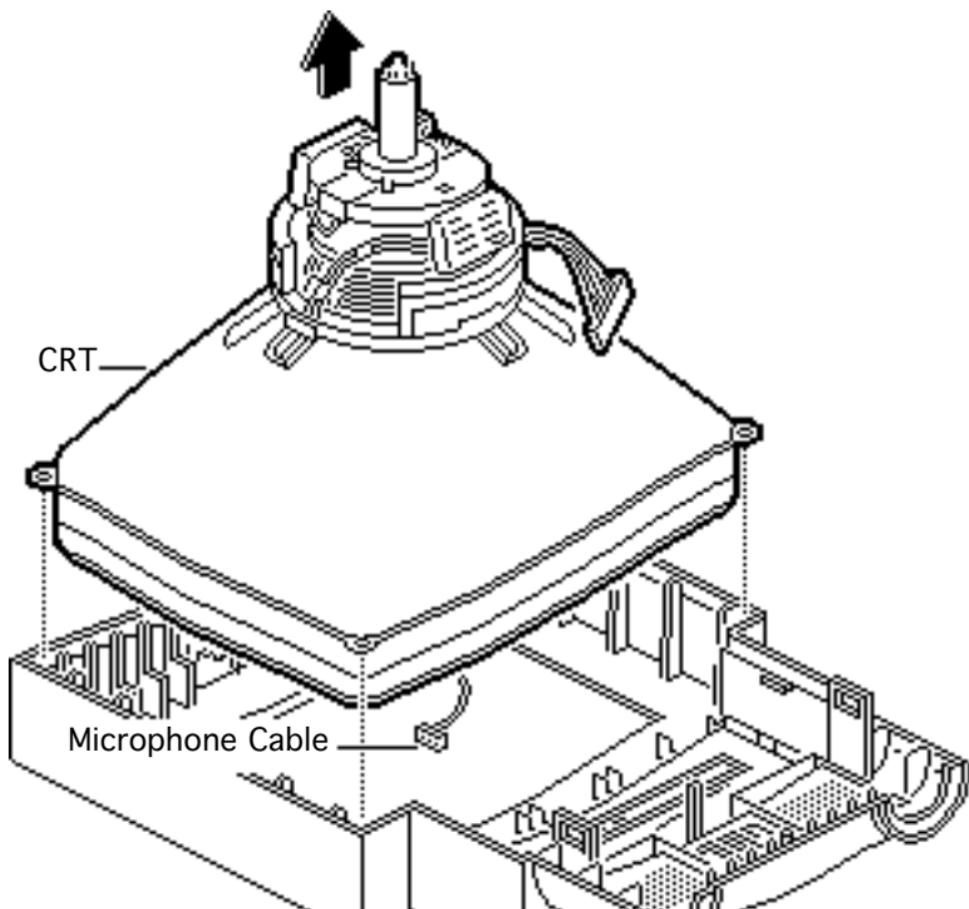
Microphone Cable

2 Lift off the CRT.

Replacement Note: Be sure the microphone cable is not caught under the CRT.

Internal Microphone
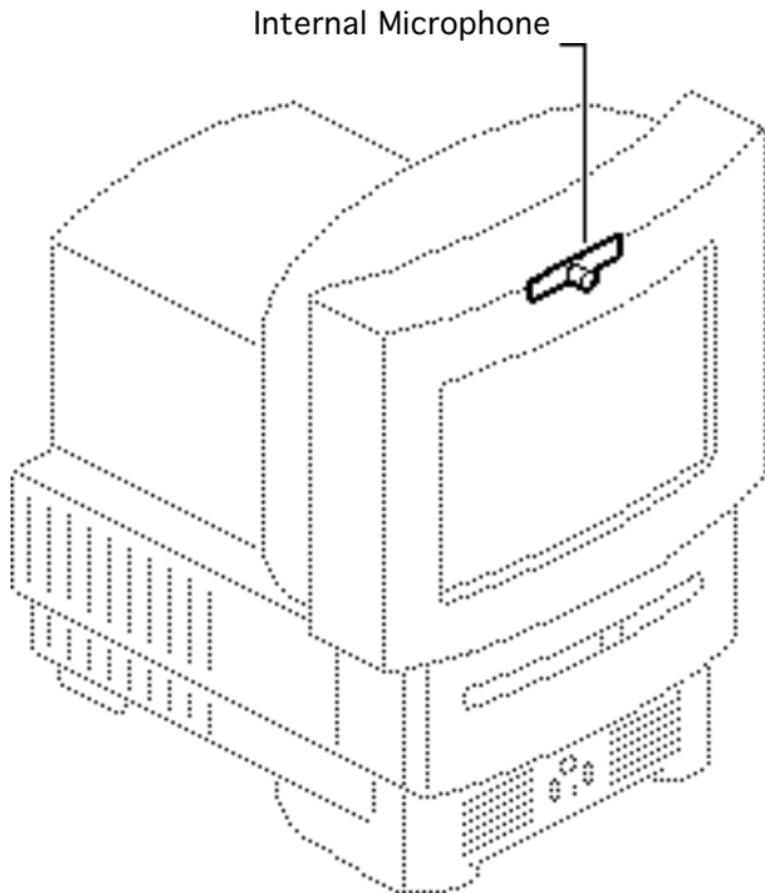
Internal Microphone

Before you begin, remove the following:

- Drive bezel
- I/O door
- CD-ROM drive
- Floppy drive
- Hard drive
- Logic board
- Rear cover
- Analog board
- Chassis harness assembly
- CRT
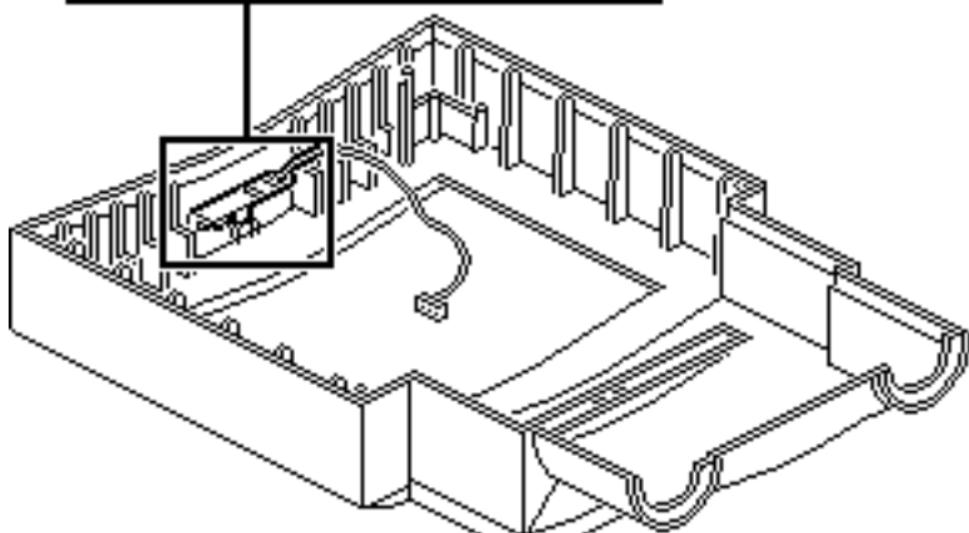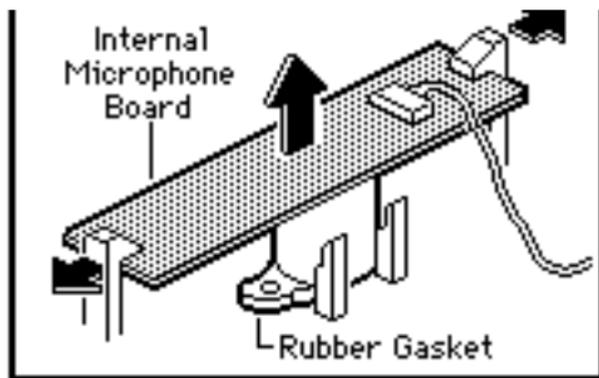
Warning: This product contains high voltage and a high-vacuum picture tube. To prevent serious injury, review CRT safety in Bulletins/Safety. Never use a grounding wriststrap until after discharging the CRT.

Push out the two latches and remove the internal microphone board and the rubber microphone gasket.

Replacement Note: Be sure the rubber gasket is in place before replacing the microphone board.

Front Bezel

Front Bezel

To remove the front bezel,
remove the following:

- Drive bezel
- I/O door
- CD-ROM drive
- Floppy drive
- Hard drive
- Logic board
- Rear cover
- Analog board
- Chassis harness assembly
- CRT
- Internal microphone
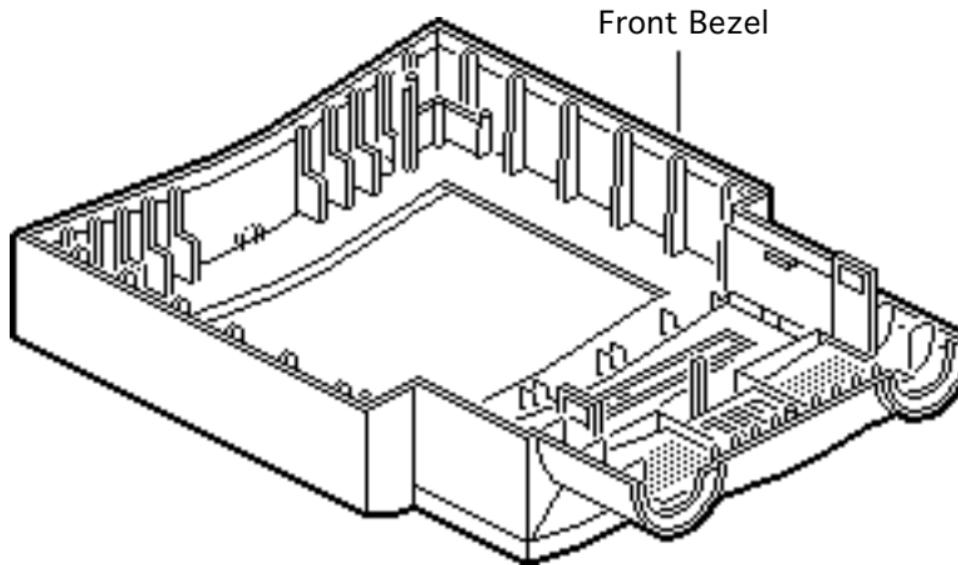
Front Bezel

Warning: This product contains high voltage and a high-vacuum picture tube. To prevent serious injury, review CRT safety in Bulletins/Safety.

Warning: Never use a grounding wriststrap until after discharging the CRT.

Upgrades

Macintosh LC 520, 550, 575

Macintosh Processor Upgrade
(including 256K Cache Card)

Macintosh Processor Upgrade

Before you begin, remove the following:

- I/O door
- Logic board
- Card in PDS slot (if any)

Caution: Review the ESD precautions in Bulletins/Safety.
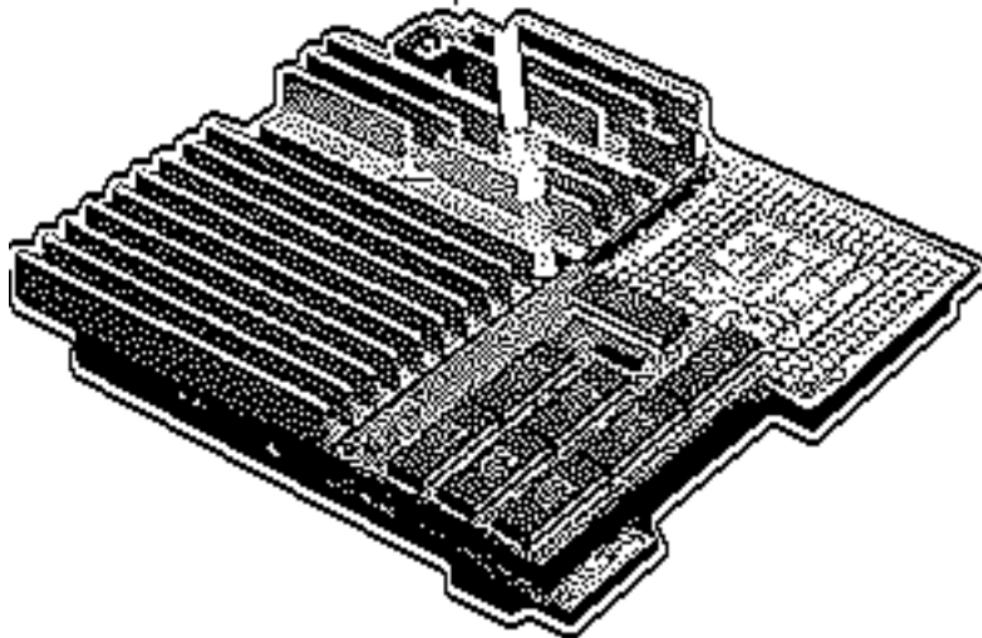
Note: The Macintosh Processor Upgrade kit allows 68LC040 computers to switch between a PowerPC 601 processor and a 68LC040 processor. The upgrade board includes the PowerPC 601 processor on board and a socket to accept the customer's 68LC040 processor.

Note: The PowerPC upgrade for the Macintosh LC 520 and 550 consists of a Macintosh LC 575 logic board, the PowerPC Upgrade Card, a new rear panel, and the 575 product ID label.

To install this upgrade, follow the Macintosh LC 575 PowerPC Upgrade procedures in this topic, substituting the 575 logic board, rear panel, and ID label for those installed on the Macintosh LC 520 and 550.

Note: Refer to the Macintosh Processor Upgrade manual for information about specifications and troubleshooting.

Hook-and-Loop Fasteners

Macintosh Processor Upgrade with 256K Cache Card

040 Heat Sink

Spacer

256K Cache Card

Processor Removal Tool
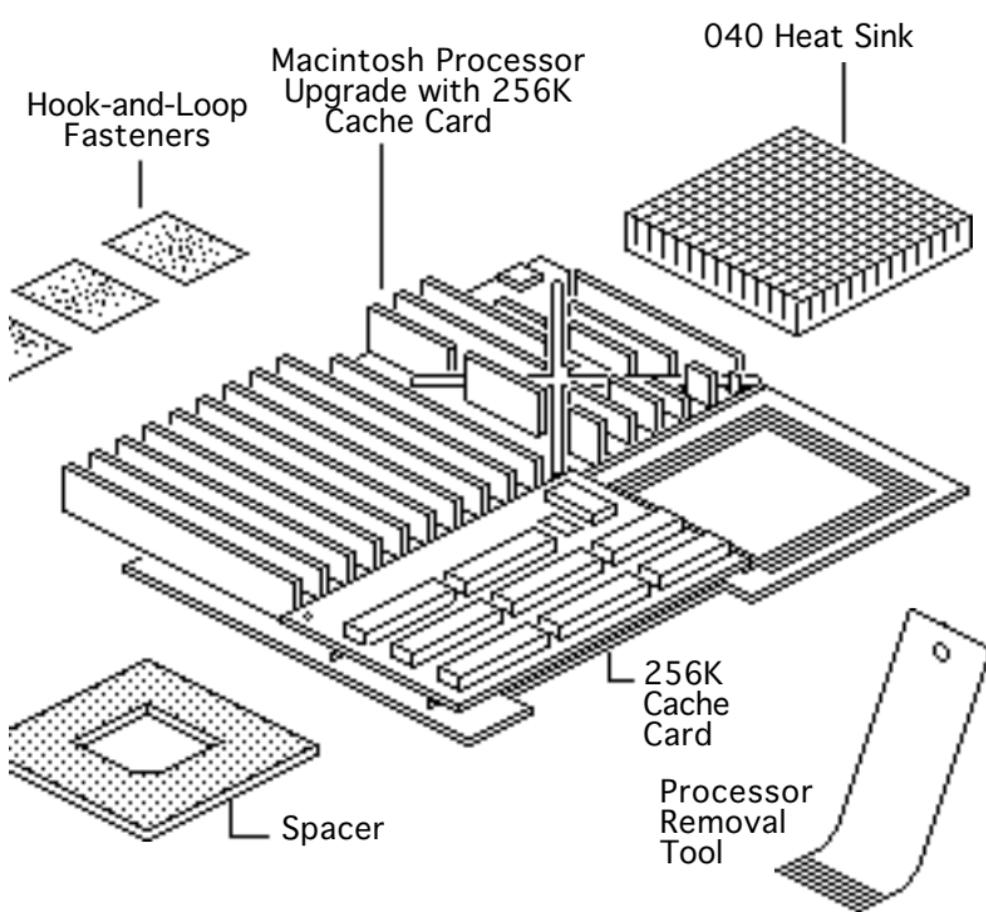
Note: The Macintosh Processor Upgrade comes packaged with the Macintosh Processor Upgrade board, 256K cache card, 040 heat sink, and hook-and-loop fasteners. If you need to order service replacement parts, order the parts separately.

Note: To install the upgrade, you will need a processor removal tool. Order the removal tool as a separate service part.

Note: The cache card comes installed on the upgrade board.

Installation Procedure Overview

These are the basic steps to installing the Macintosh Processor Upgrade.

- Remove the 68LC040 processor from the customer's logic board
- Install the 68LC040 processor on the upgrade board
- Prepare the upgrade and logic boards for installation
- Install the upgrade board on the logic board

- Reinstall the cache card on the upgrade board

Detailed procedures follow.

Remove the 68LC040 Processor from the Logic Board

1 Locate the 68LC040 processor on the logic board.

68LC040 Processor

Processor

Processor Removal Tool

Logic Board Socket

2   Position the teeth of the processor removal tool in the groove between the processor and the logic board socket.

Caution: Be sure to lift up on the handle of the processor removal tool. Pressing down could damage components on the logic board.

Processor

Processor Removal Tool

Logic Board Socket
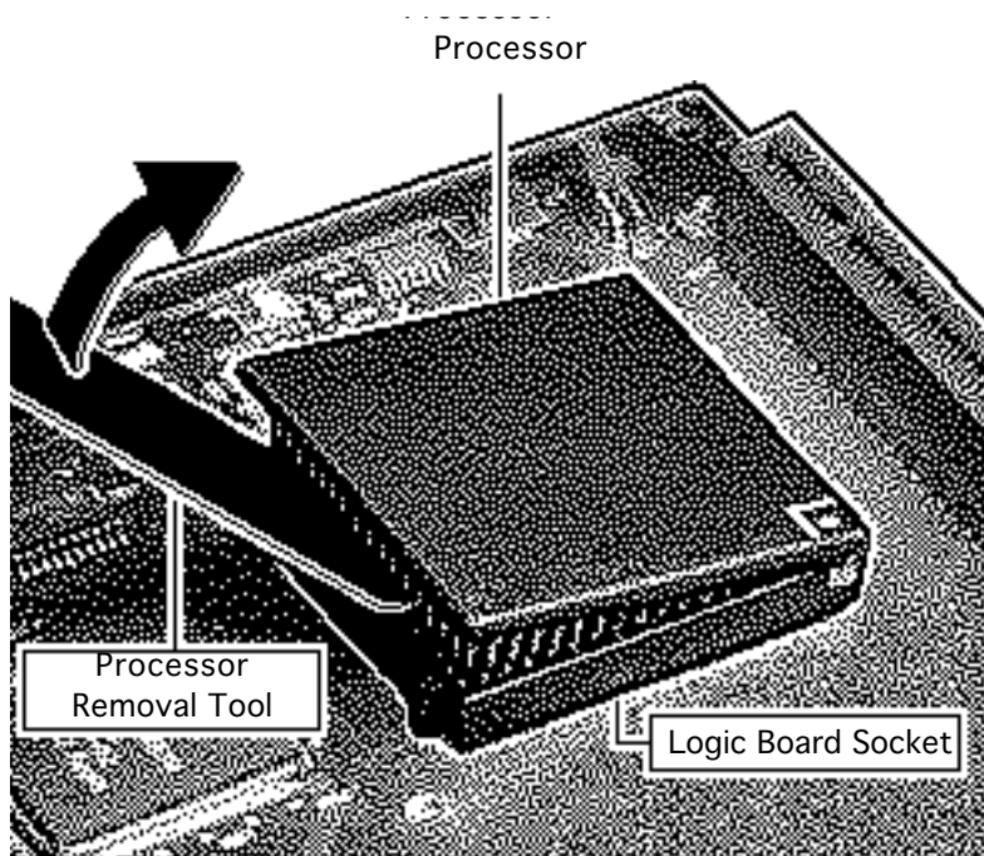
Note: This graphic shows the proper way to remove a 68LC040 chip from its logic board. Your logic board may differ somewhat from this graphic.

3 **Caution:** Pry up each side of the processor only slightly to avoid bending the pins.

Gently lift up the processor removal tool handle and pry up each side of the processor from the socket.

4 Remove the processor.

Spacer

Alignment Corners   68LC040
                         Processor
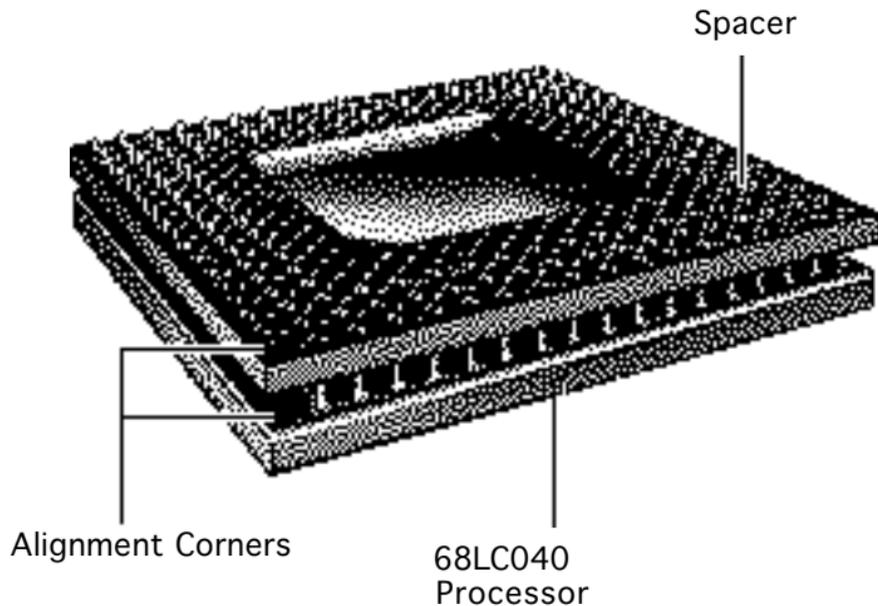
Install the 68LC040 Processor on the Upgrade Board

Note: The alignment corner of the 68LC040 processor is missing one pin. The alignment corner of the spacer is missing a pin hole.

1 Position the spacer alignment corner over the 68LC040 processor alignment corner

2 Place the spacer on the processor.
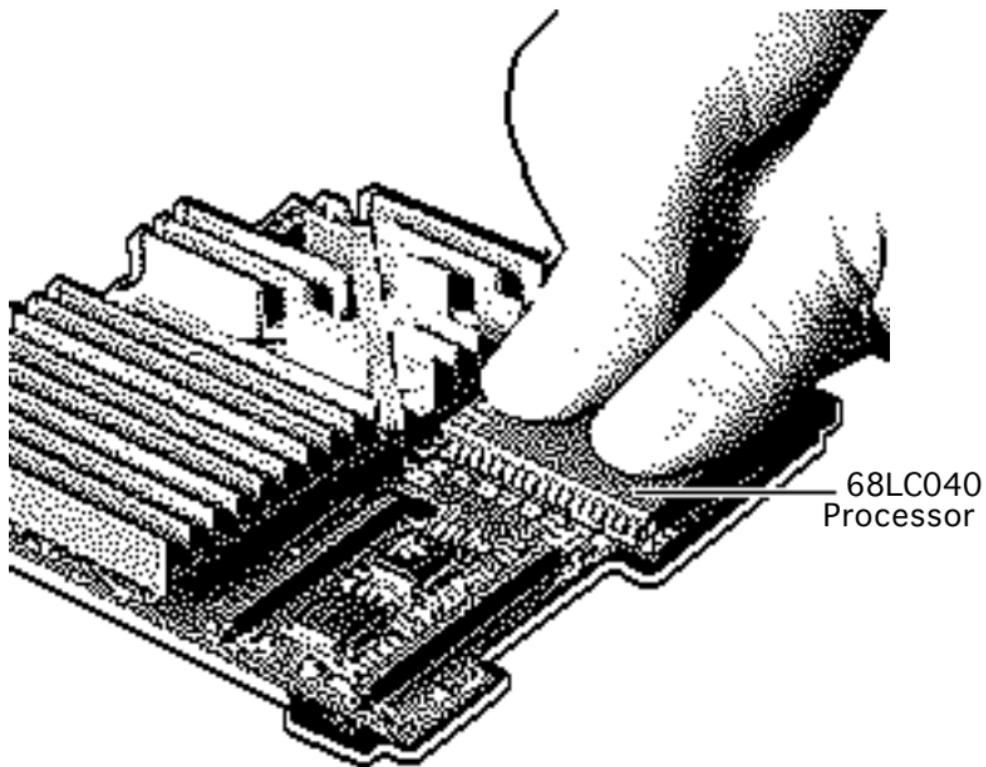
68LC040
Processor

Caution: Forcing the 68LC040 processor connector pins into the socket could damage the pins. If the processor resists installation, check the pin alignment.

Caution: Place the upgrade board on a firm even surface to avoid bending the upgrade board when pressing the processor into the socket.

Caution: Use two thumbs to evenly distribute the pressure as you press the processor into the socket.

3   Hold the processor and
    spacer together and
    position the spacer
    alignment corner over
    the upgrade socket
    alignment corner.

4   Press the processor
    connector pins into the
    socket until you hear a
    "snap."

Note: On a correctly installed 040 processor, a very small gap separates the 040 chip from the metal spacer. A larger gap caused by the barrel sockets of the upgrade board separates the upgrade board and the spacer.

040 Processor

Small Gap

Spacer

Barrel Sockets

Upgrade
Board
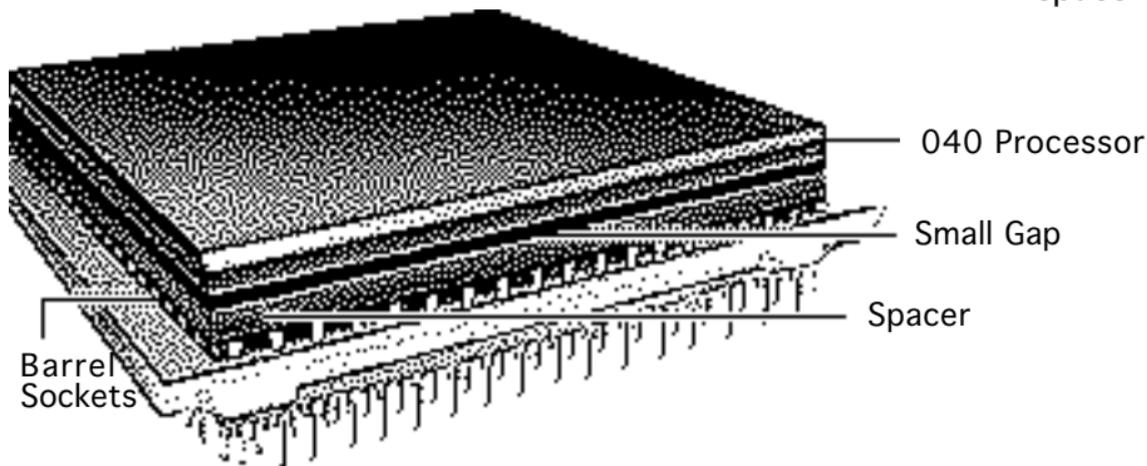
256K Cache
Card

Prepare the Upgrade and Logic Boards for Installation

Note: The following steps explain how to prepare the upgrade board and logic board to connect with each other.

1   Remove the 256K cache card from the upgrade board.

Antistatic Foam

Logic Board,
Bottom Side
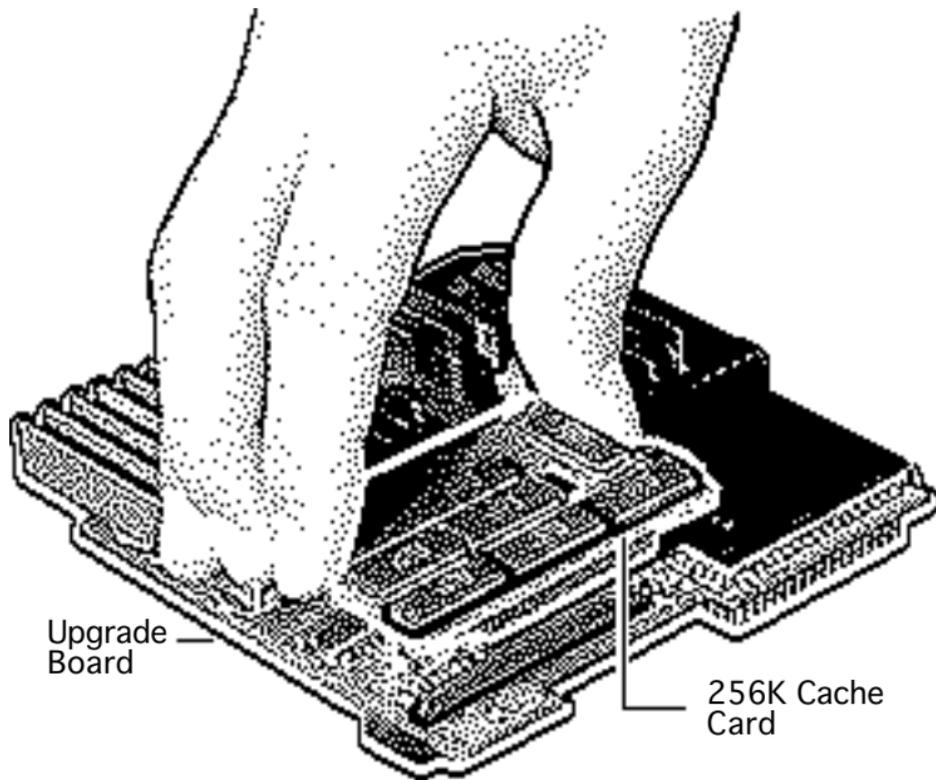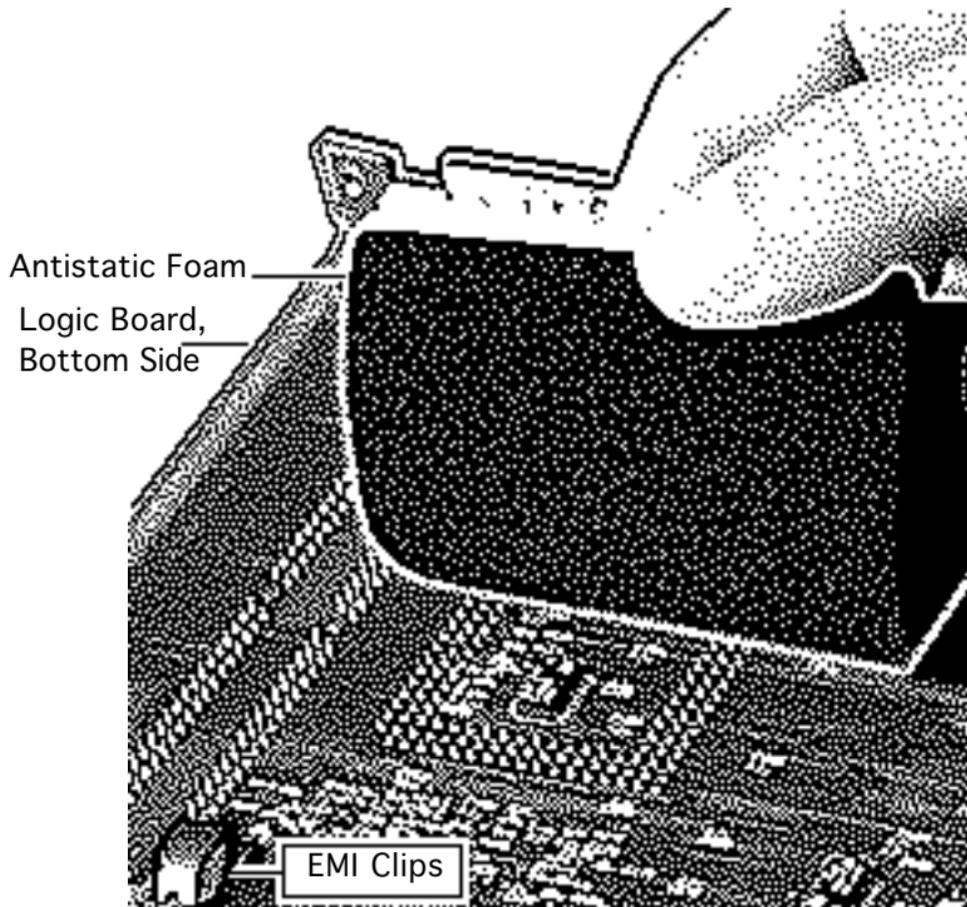
EMI Clips

Note: You will reinstall the cache card after the upgrade board connects to the logic board.

Caution: The EMI clips on the bottom of the LC 575 logic board flex easily. Do not apply heavy pressure directly to these clips or you may bend the logic board.
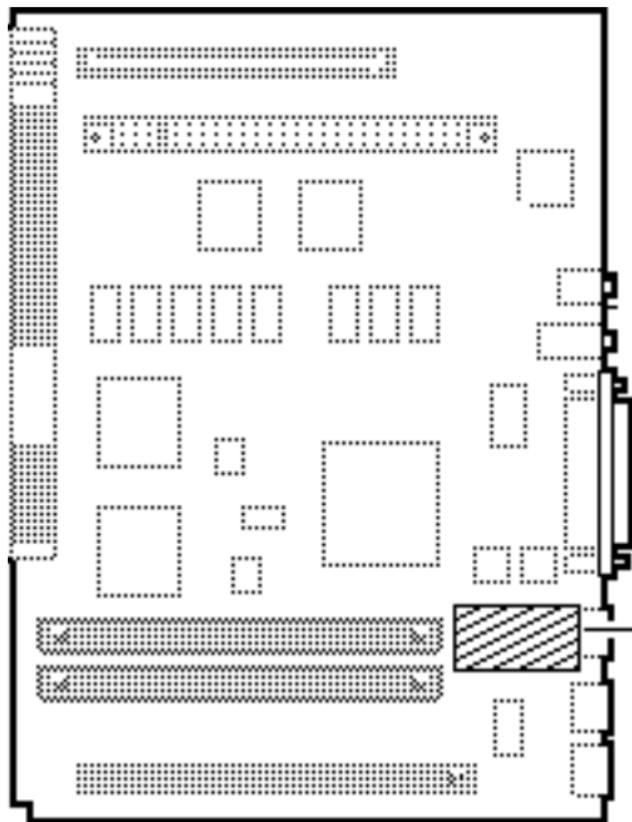
Hook-and-Loop
Fastener

2 **Note:** This step helps prevent the logic board from bending when you apply pressure in the next few steps.

Place a piece of antistatic foam directly under the processor socket on the bottom side of the logic board.

3 Peel the tape from the remaining sides of the two hook-and-loop fasteners.   Afix the fastener in the position shown on the logic board.

Battery

Hook-and-Loop
Fastener
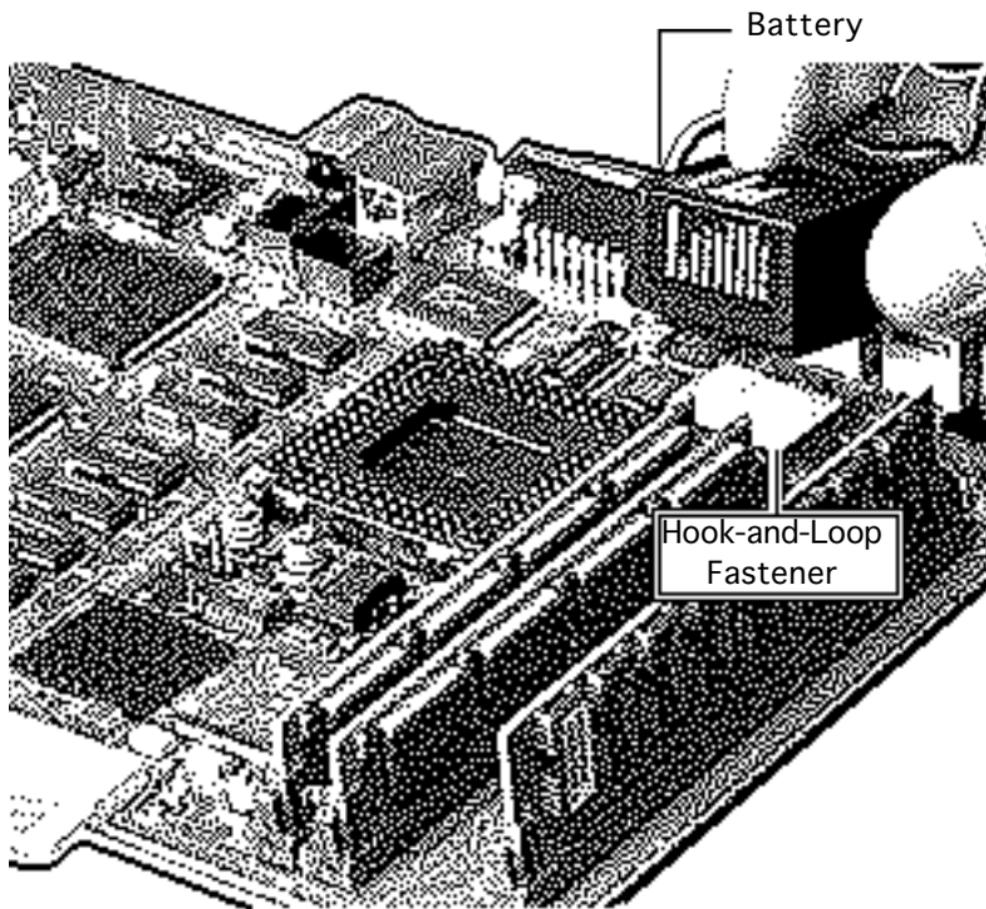
4 **Note:** This step makes
room for the processor
upgrade board.

Move the battery from
its original hook-and-
loop fastener to the
fastener on the chip
behind the ADB ports.

Upgrade Connector
Alignment Corner

Logic Board Socket
Alignment Corner
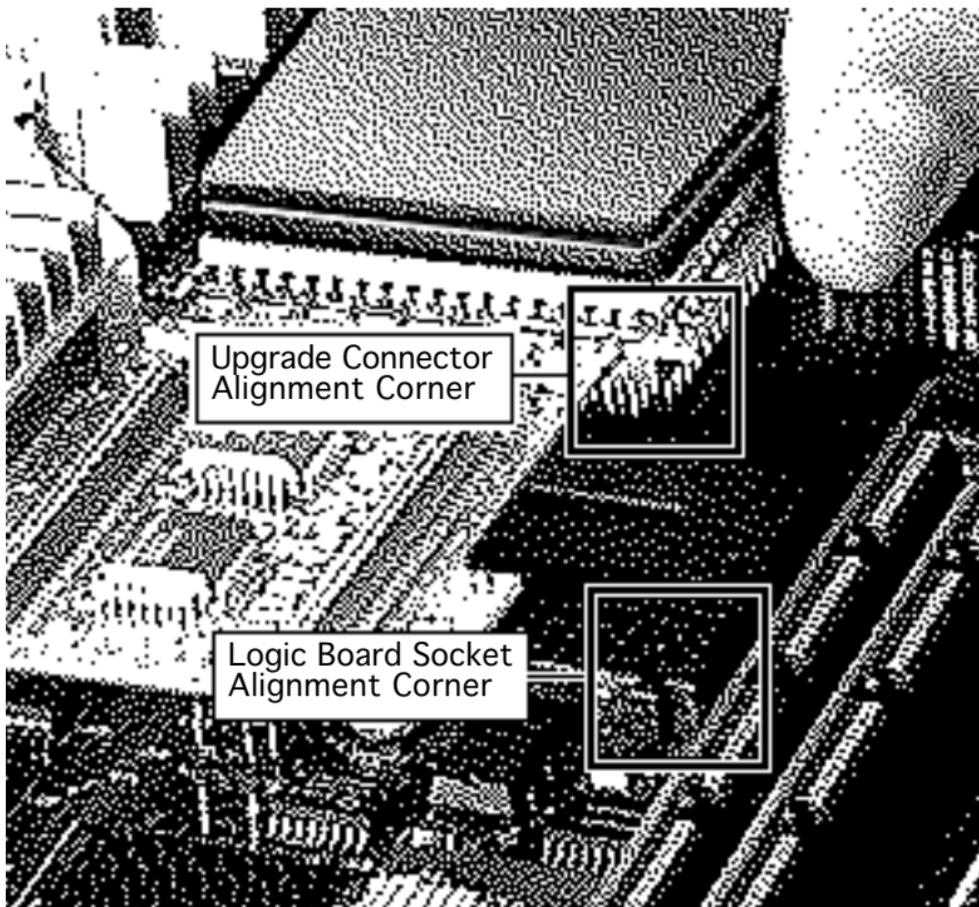
Install the Upgrade Board on the Logic Board

Caution: Forcing the upgrade board connector pins into the logic board socket could damage the pins. If the connector resists installation, check the pin alignment.

1 Position the upgrade connector alignment corner over the logic board socket alignment corner.

2   Carefully align the pins
    along all sides of the
    processor and socket.

3   Firmly press the
    connector pins into the
    logic board socket.

PowerPC Heat Sink

Hole for Battery Connector
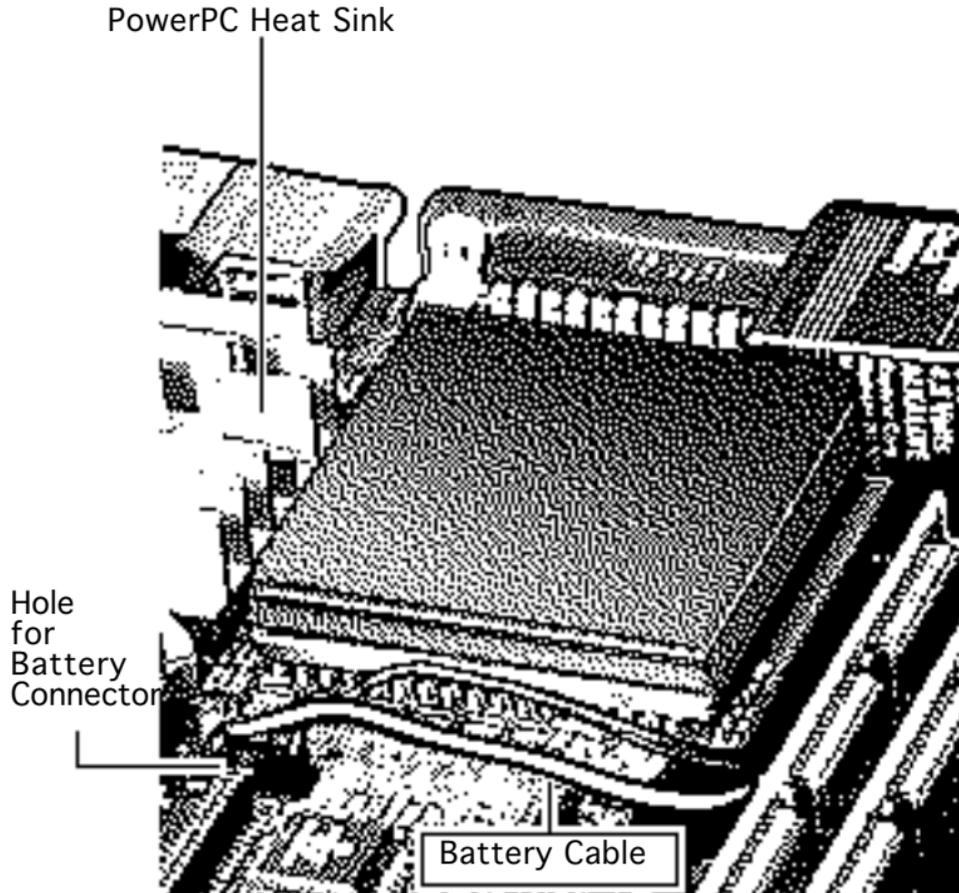
Battery Cable

Note: After you install the upgrade board, connect the battery cable through the hole in the upgrade board and reinstall the cache card.

4 Drop the battery connector through the hole in the upgrade board and connect the battery to the logic board.

5 **Caution:** The heat of the heat sink can melt the battery cable.

Route the battery cable to avoid contact with the heat sink.

Processor
Upgrade
Board
Long Row of Pins
Long Pin Socket
Cache
Card
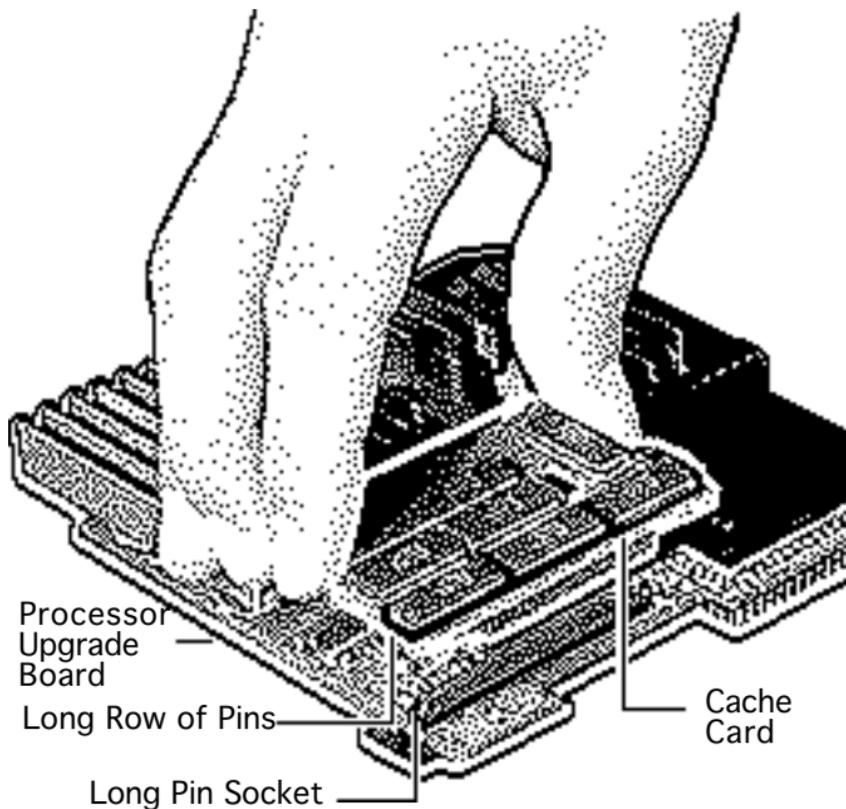
6 **Note:** There are two
   sockets on the cache
   card.

   Align the longer cache
   card socket with the
   longer row of pins on the
   upgrade board.

7 Firmly press the cache
   card onto the upgrade
   board.

Note: To install the
software, refer to the
upgrade Owner's Guide.

Logic Board and Upgrade Board Returns

Return the upgrade and logic boards to their original conditions before sending them to Apple. Be sure to remove the upgrade board from the logic board and reinstall the 68LC040 processor on the logic board.

Replacement Caution: To avoid bending any pins when removing the 68LC040 processor, pry up each side only slightly.

# Additional Procedures

Macintosh LC 520, 550, 575

Battery Verification, LC 520

Before you begin, remove the following:
• I/O door
• Logic board

⚠**Warning:** If handled or discarded improperly, the lithium battery in the computer could explode. Review battery handling and disposal instructions in Bulletins/Safety.

Negative Probe

Positive Probe

Caution: Review the ESD precautions in Bulletins/Safety.

1 Set the voltmeter to the 10 volts DC scale.

2 Hold the positive probe of the voltmeter to the positive end of the battery and the negative probe to the negative end of the battery.

3 If the battery voltage is below 3.0 volts, replace the battery. Refer to "Battery Replacement" in this chapter.
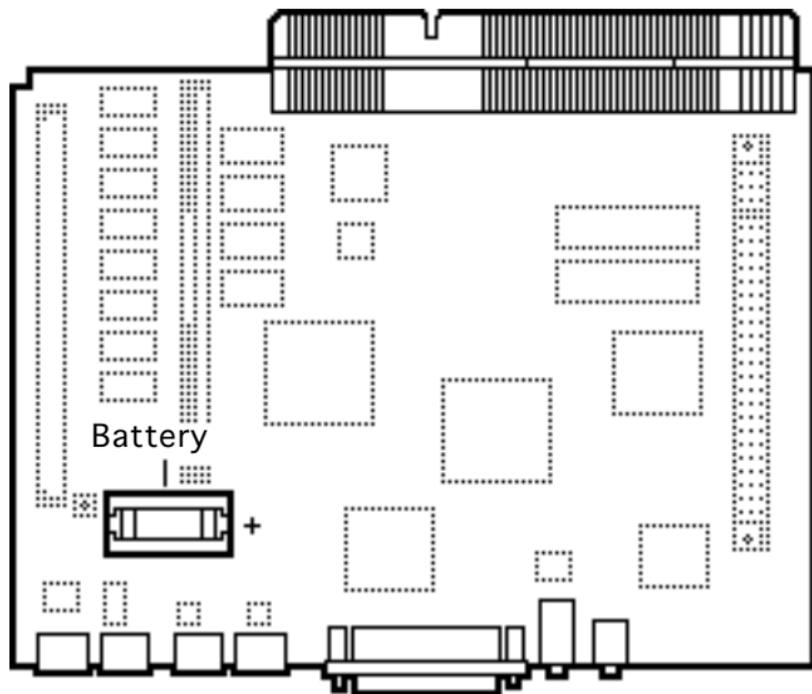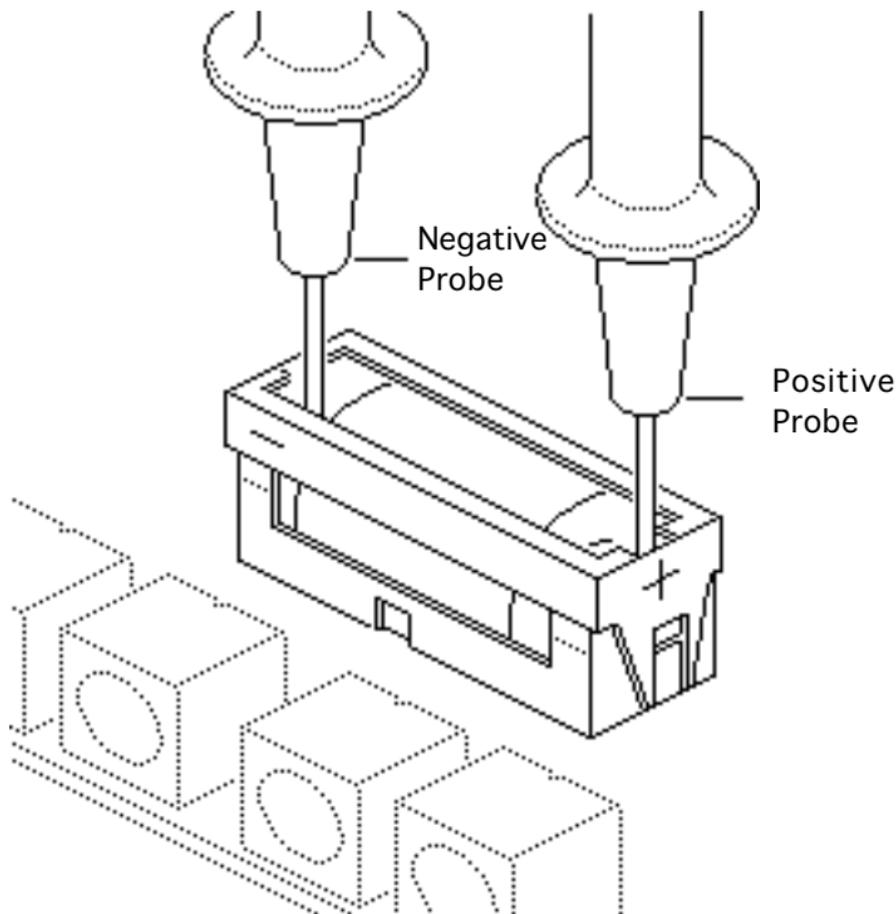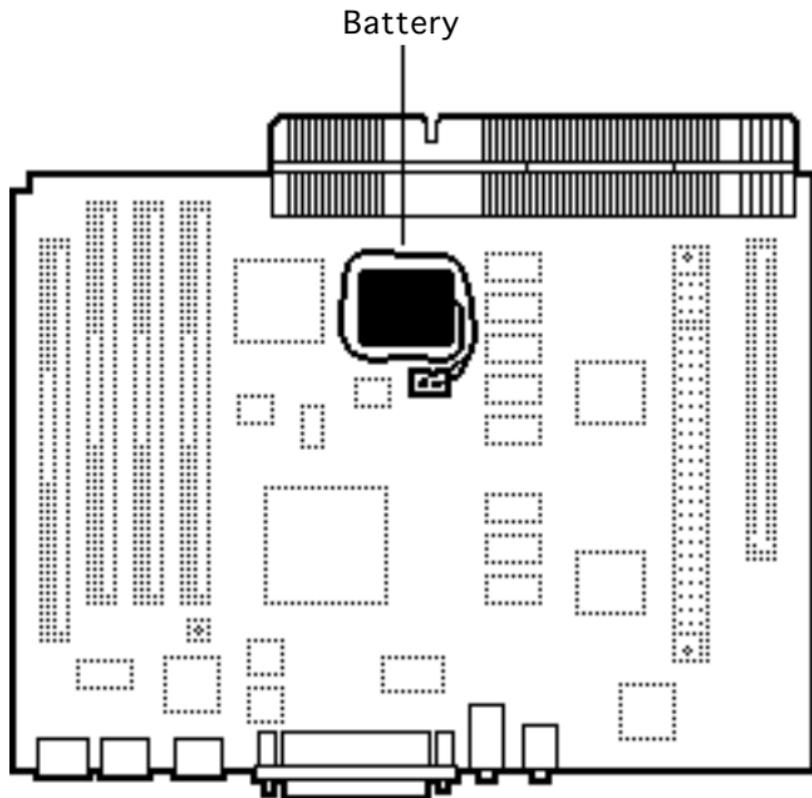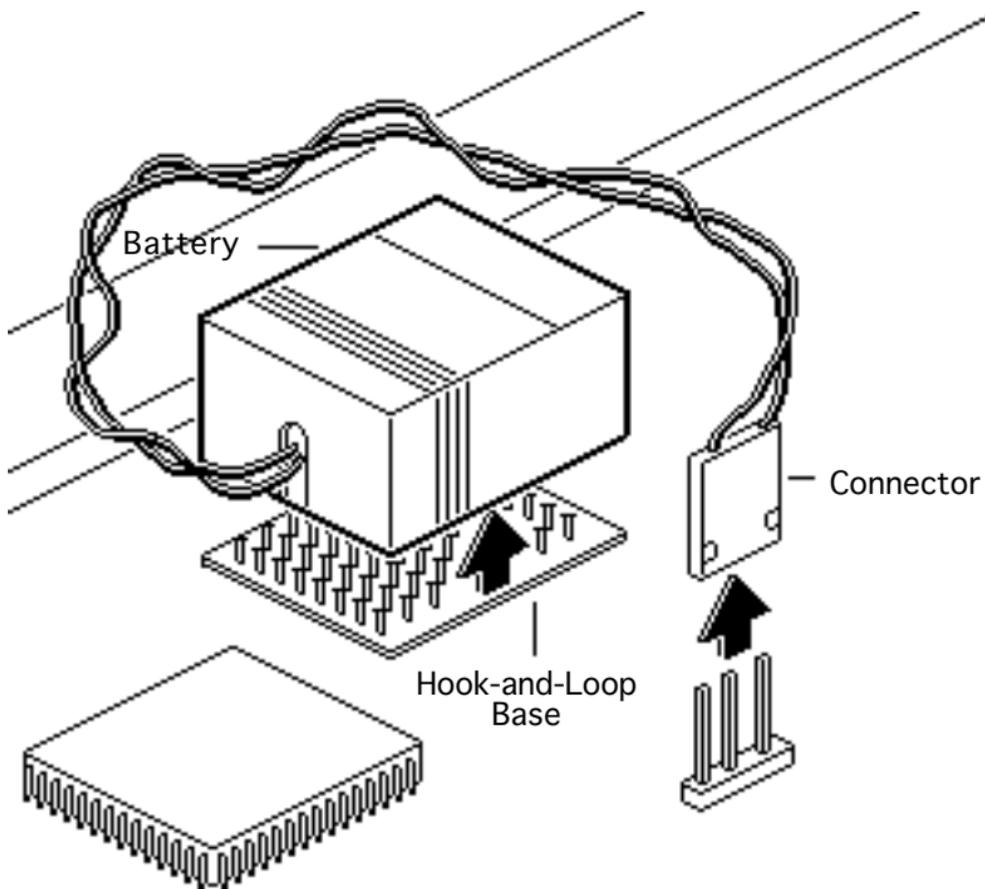
Battery

Battery Verification, LC 575

Before you begin, remove the following:

- I/O door
- Logic board
- Battery

Caution: Review the ESD precautions in Bulletins/Safety.
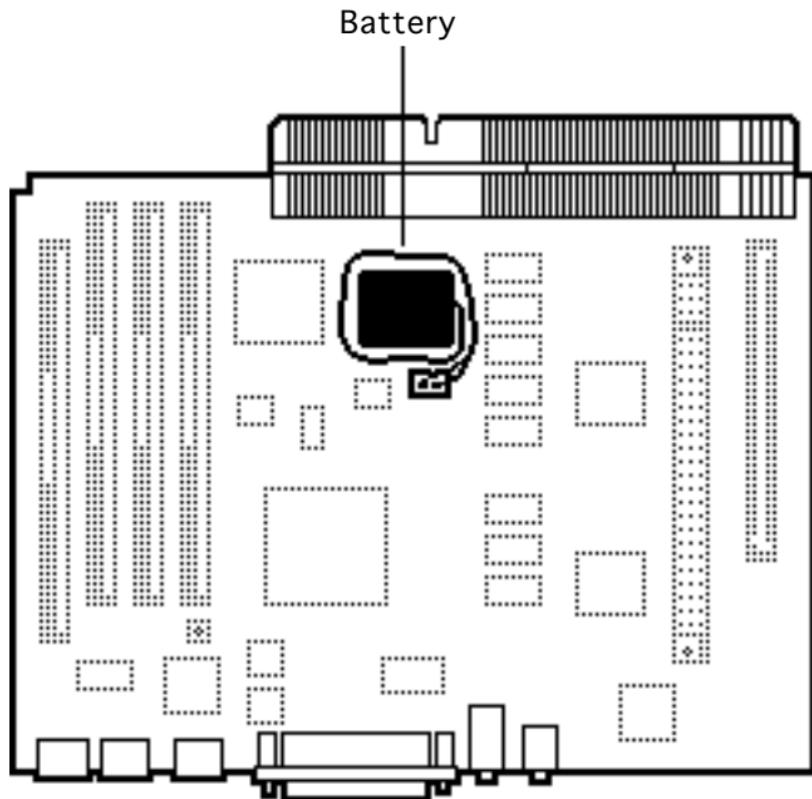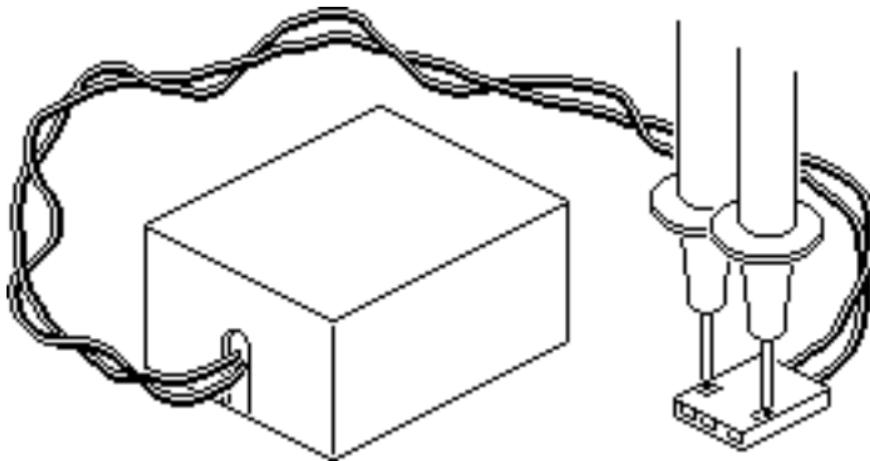
1 Set the voltmeter to the 10 volts DC scale.

2 Hold the positive probe of the voltmeter to the positive end of the battery and the negative probe to the negative end of the battery.

3 If the battery voltage is below 3.0 volts, replace the battery. Refer to "Battery Replacement" in this chapter.

Battery

Battery Replacement, LC 520

Before you begin, remove the following:
• I/O door
• Logic board

⚠️**Warning:** If handled or discarded improperly, the lithium battery in the computer could explode. Review battery handling and disposal instructions in Bulletins/Safety.

Cover
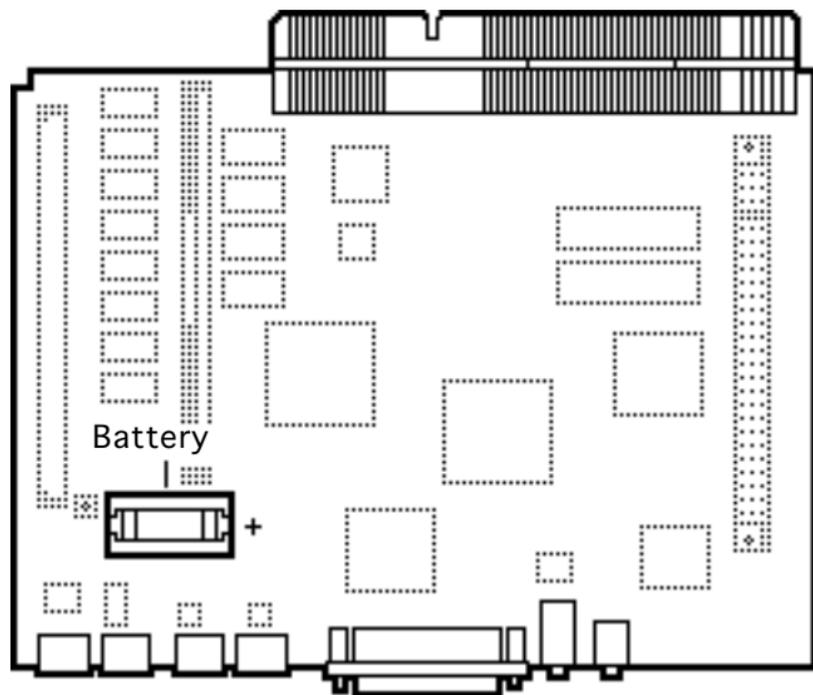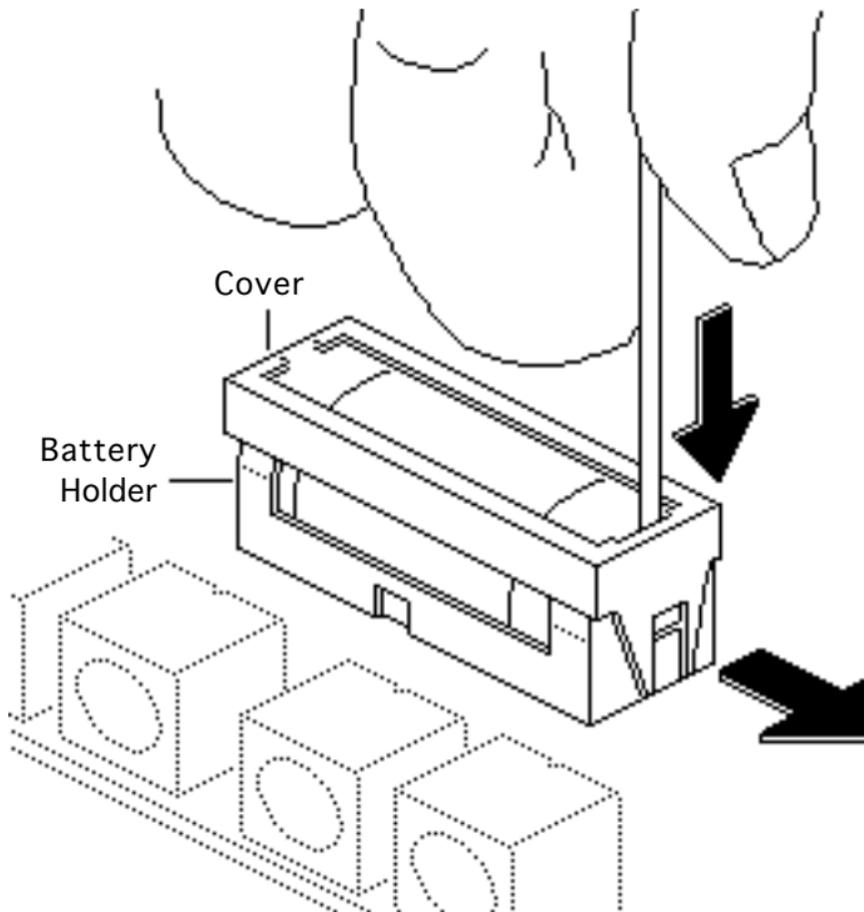
Battery
Holder

Caution: Review the ESD precautions in Bulletins/ Safety.

1 Insert a small flat-blade screwdriver into the top of the battery holder cover and gently push down and out with the screwdriver to release the tab.

2 Repeat on the other end and remove the cover from the battery holder.
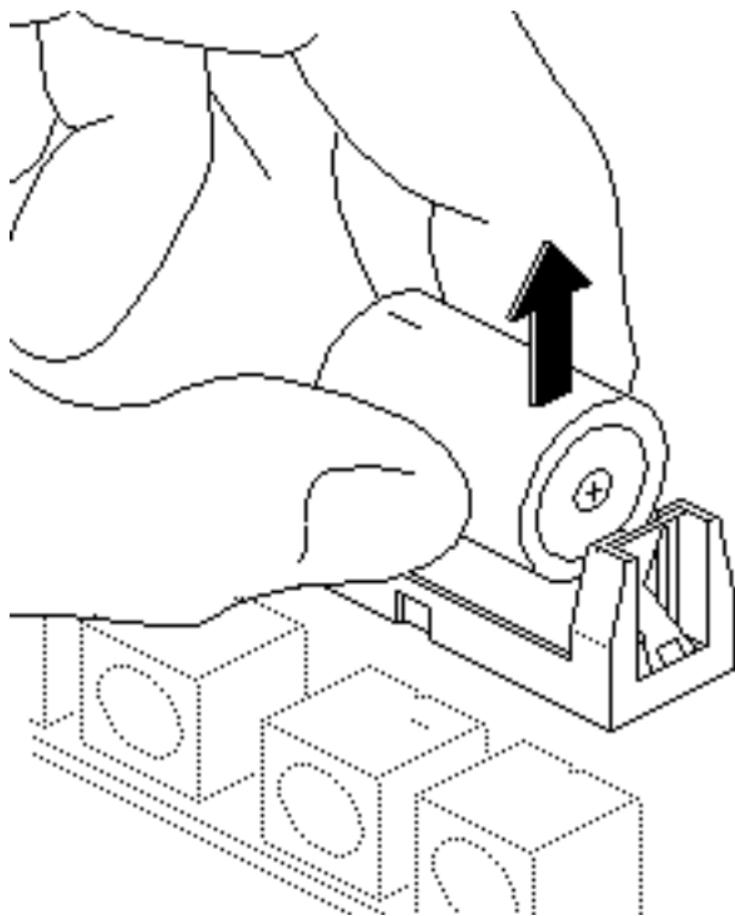
3 Grasp the battery and remove it from the holder.

4 Return the battery to Apple for proper disposal. For battery packaging and labeling instructions, refer to the safety information in Bulletins/Safety.

Battery

Battery Replacement, LC 575

Before you begin, remove the following:
- I/O door
- Logic board

Caution: Review the ESD precautions in Bulletins/Safety.

1 Pull up and disconnect the connector.

2 Pull up and remove the battery from its hook-and-loop base.

Battery

Connector

Hook-and-Loop Base

Adjustments

Macintosh LC 520, 550, 575

Adjustment
Controls

WARNING:
High Voltage Areas

Geometry

Before you begin, remove
the rear cover.

⚠️**Warning:** This product
contains high voltage and a
high-vacuum picture tube.
To prevent serious injury,
review CRT safety in
Bulletins/Safety.
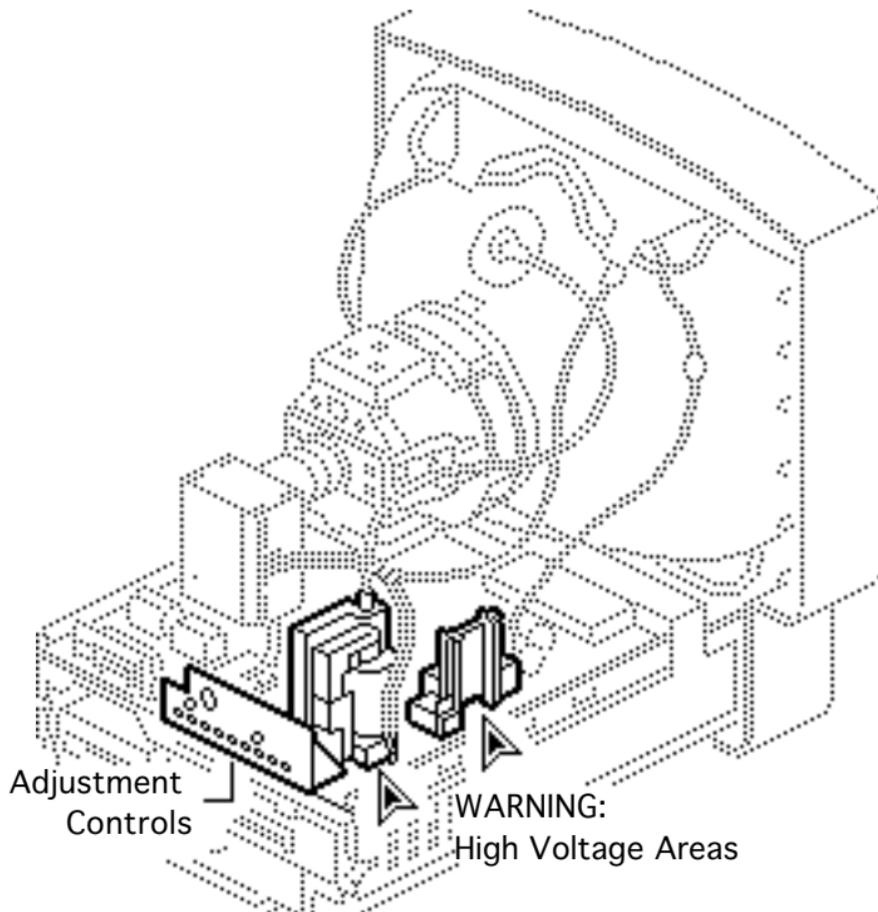
Note: The controls on this monitor require a small hex-head plastic tool to make adjustments. If the tool is long, it will be too flexible, which will make fine adjustments difficult. Use a short hex-head plastic tool to minimize flexing.

⚠️**Warning:** Do not use metal alignment tools—they are a shock hazard.
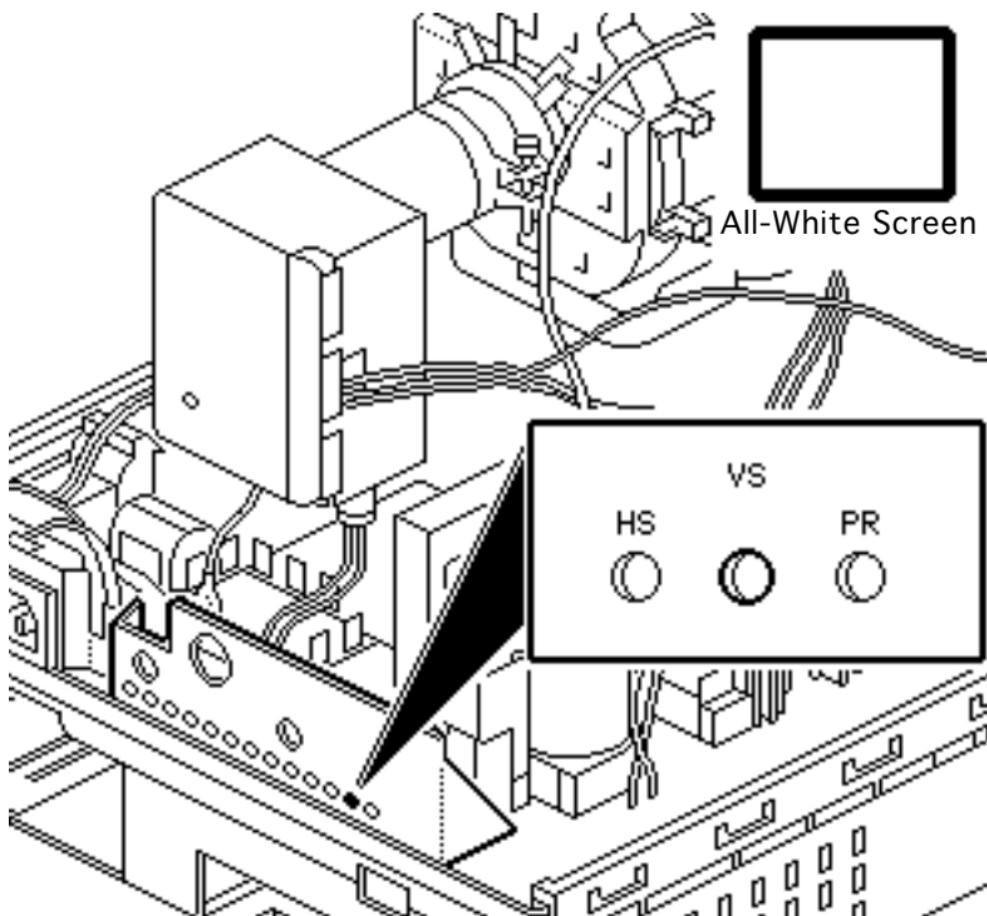
All-White Screen

Vertical Center

1 Use Display Service Utility to display the All-White Screen test pattern.

2 Using a hex-head plastic adjustment tool, adjust the vertical center (VS) control until the raster is centered (top to bottom) in the display area.

All-White Screen
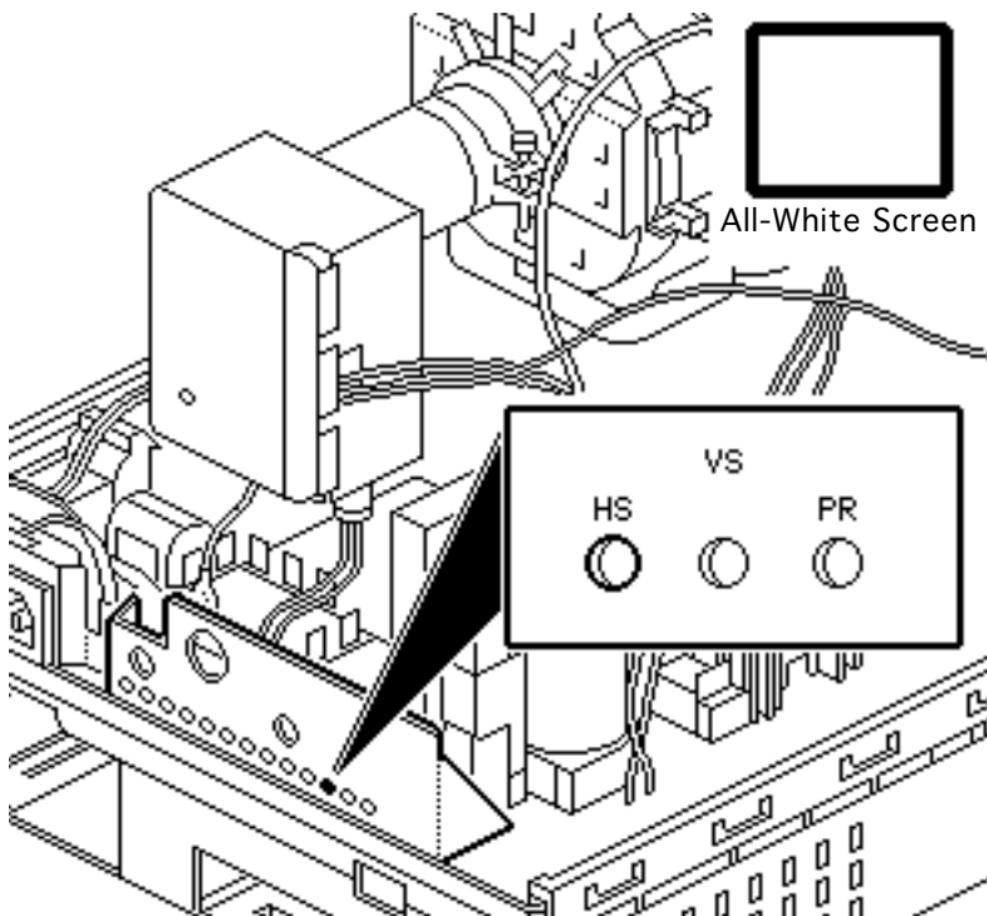
Horizontal Center

Using a hex-head plastic adjustment tool, adjust the horizontal center (HS) control until the raster is centered (side to side) in the display area.
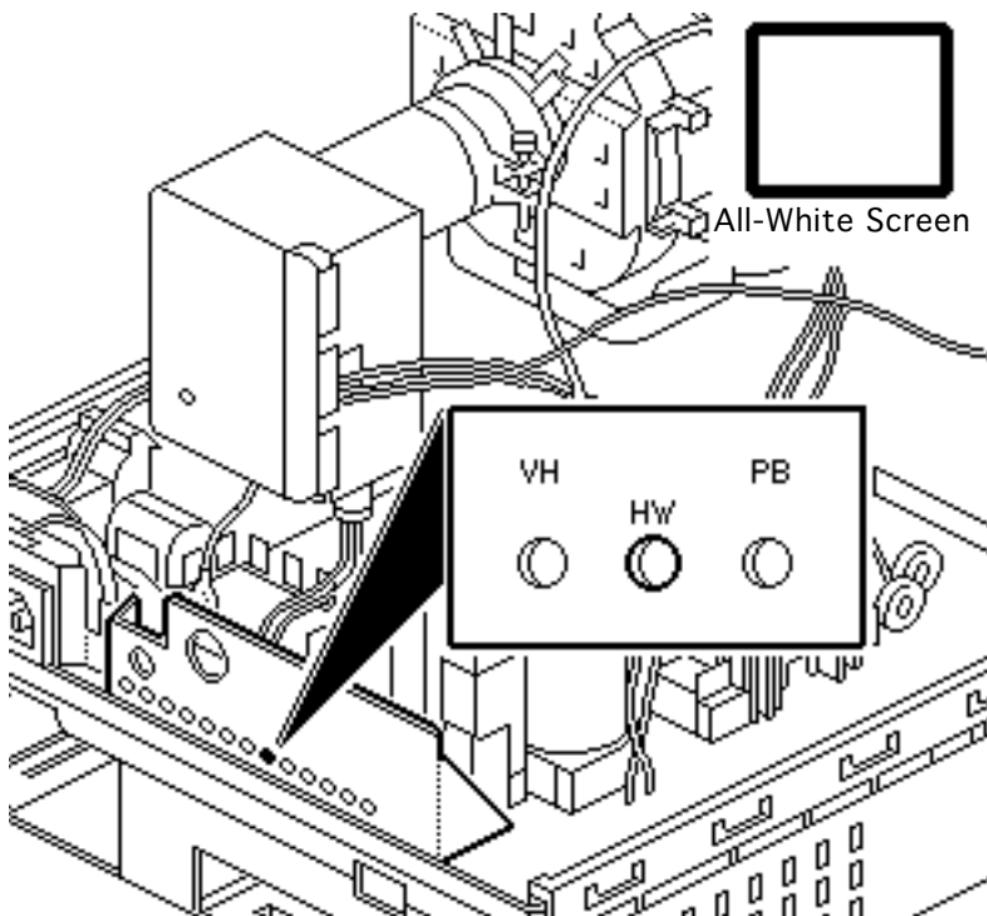
All-White Screen
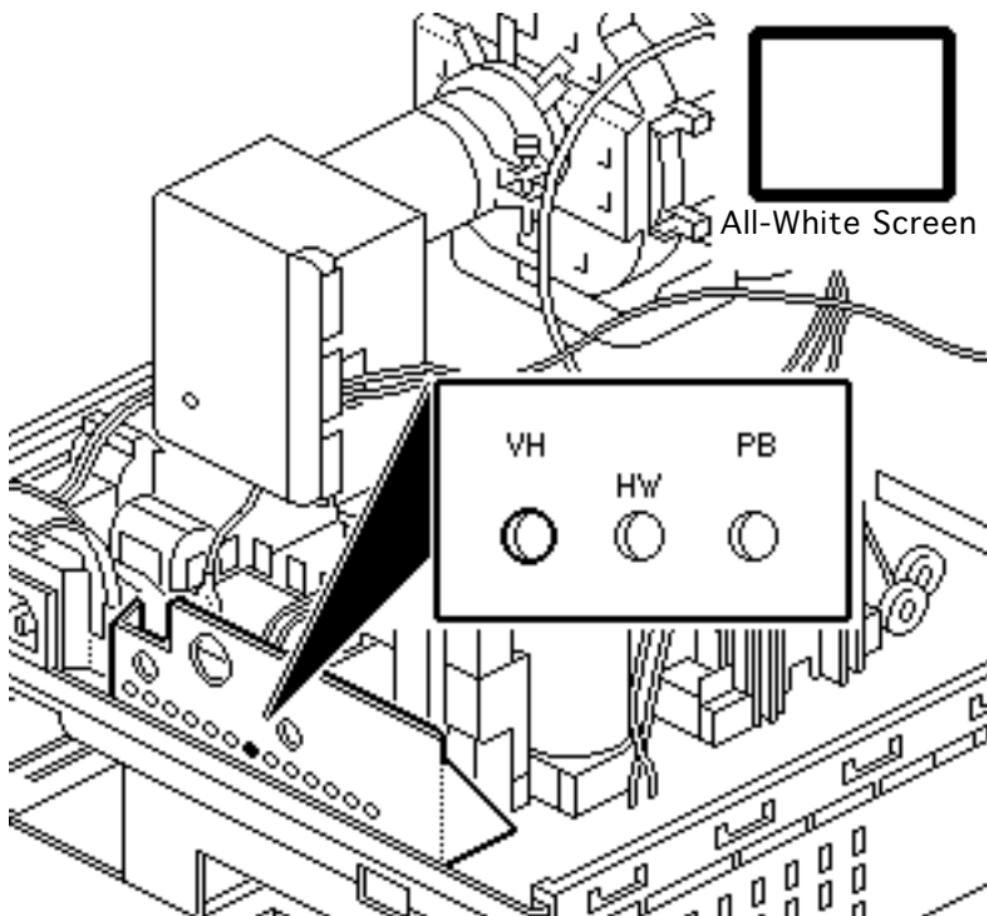
Vertical Size

1 Using a hex-head plastic adjustment tool, adjust the vertical height (VH) control until the raster height is 7 inches (± 1/8 inch) or 176 mm (± 2 mm).

2 Verify this height. If it is off, repeat the vertical size adjustment and, if necessary, the vertical center adjustment.

All-White Screen

Horizontal Size

Note: Due to video features and timing differences across the Apple line of Macintosh computers, the width of the raster/image area on the Macintosh LC 520 screen may vary up to 3/16 inch at each side of the screen. Perform the horizontal size adjustment to set the display to its proper width.

Using a hex-head plastic adjustment tool, adjust the horizontal width (HW) control until the raster is 9 1/4 inches (± 1/8 inch) or 235 mm (± 2 mm).
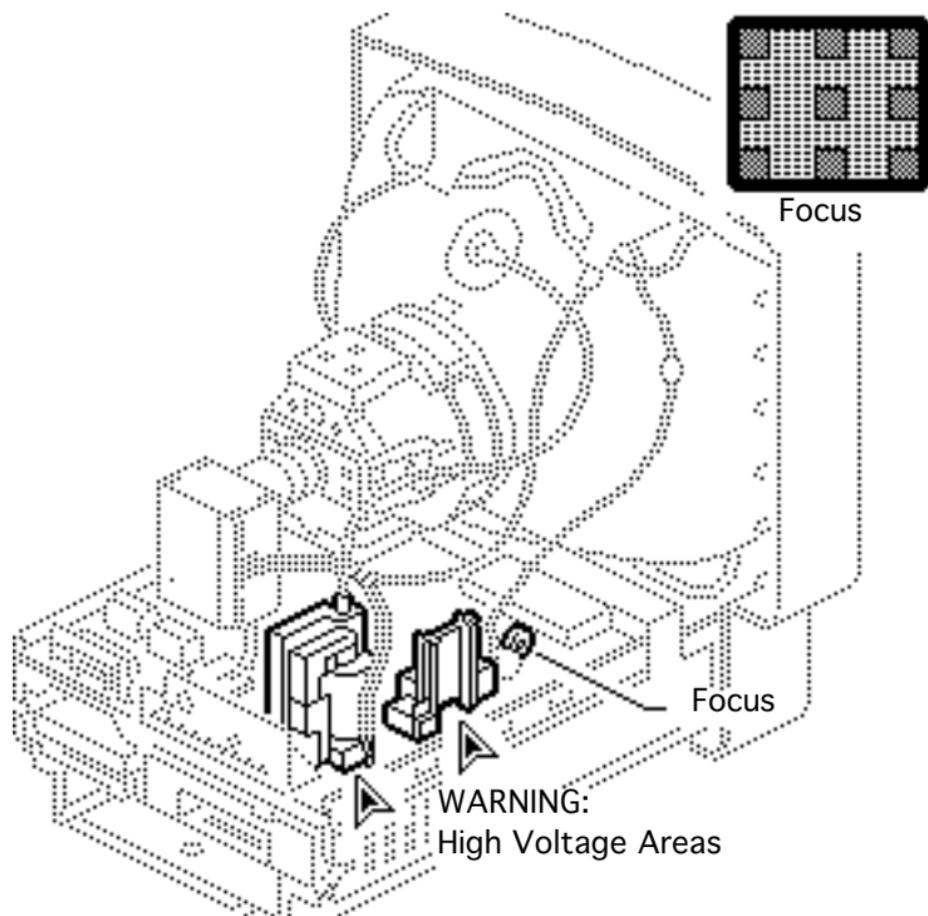
Focus

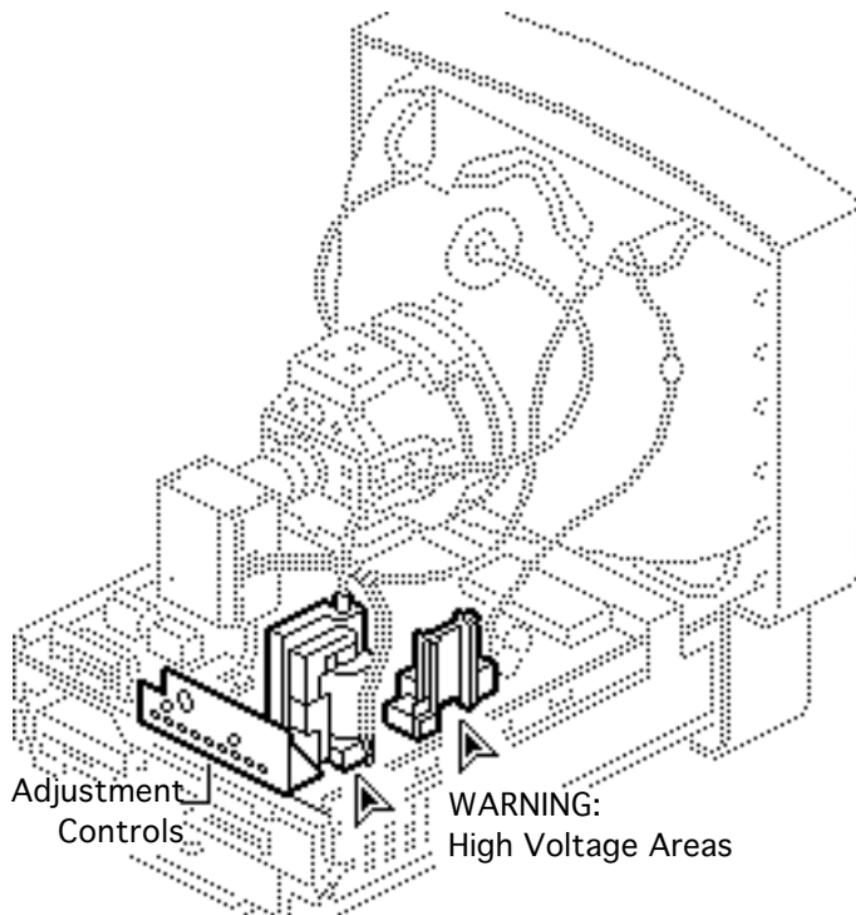## Focus

1 Use Display Service Utility to display the Focus test pattern.

2 Using a hex-head plastic adjustment tool, adjust the focus control until the Focus test pattern is as clear as possible.

Focus

WARNING:
High Voltage Areas

Adjustment Controls

WARNING: High Voltage Areas

Video

Before you begin, remove the rear cover.

⚠️**Warning:** This product contains high voltage and a high-vacuum picture tube. To prevent serious injury, review CRT safety in Bulletins/Safety.
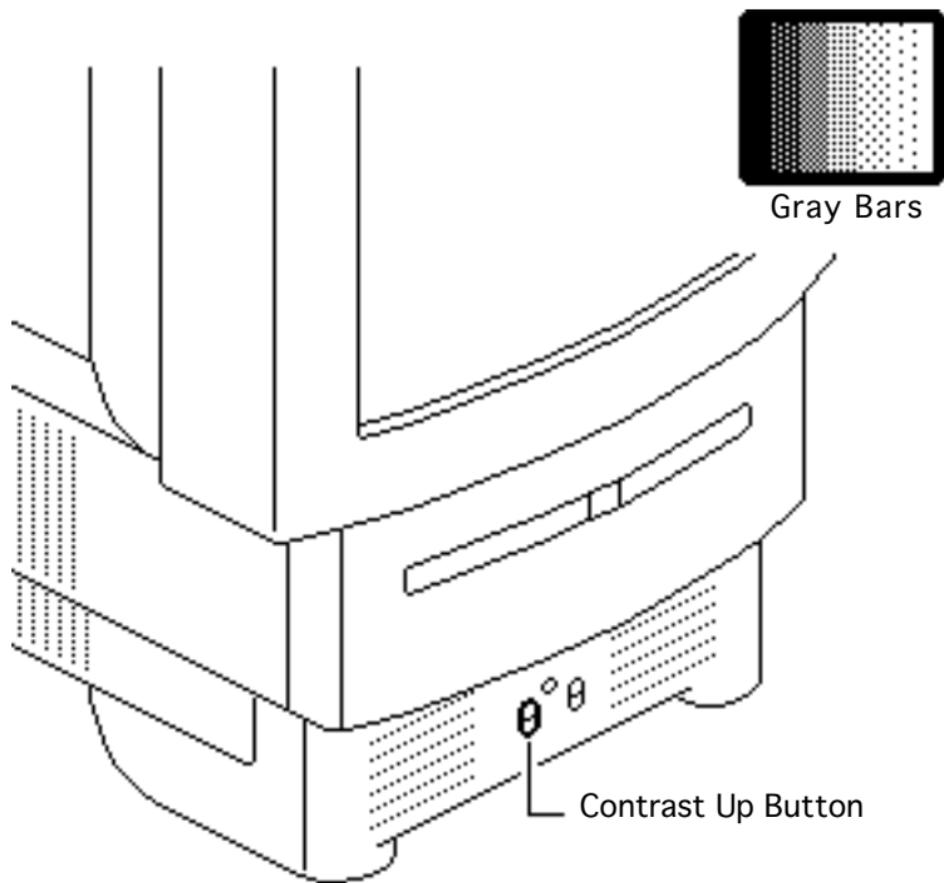
Note: Perform the cutoff adjustment prior to adjusting the white balance.

Replacement Note: Perform the cutoff adjustment whenever you replace the CRT or the analog board.
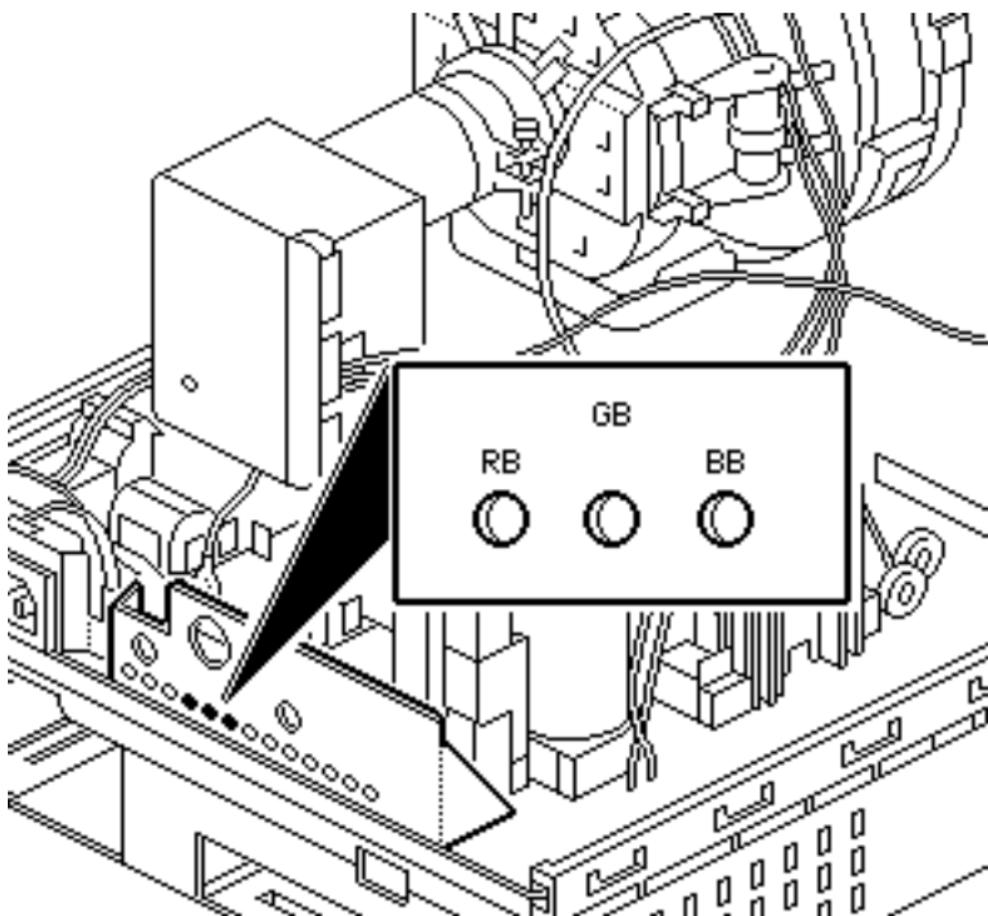
Gray Bars

Contrast Up Button

Cutoff

Note: Perform the cutoff and white balance adjustments after the monitor has been on for at least 10 minutes.

1 Use Display Service Utility to display the Gray Bars test pattern.

2 Press the Contrast Up button and set screen contrast to maximum.

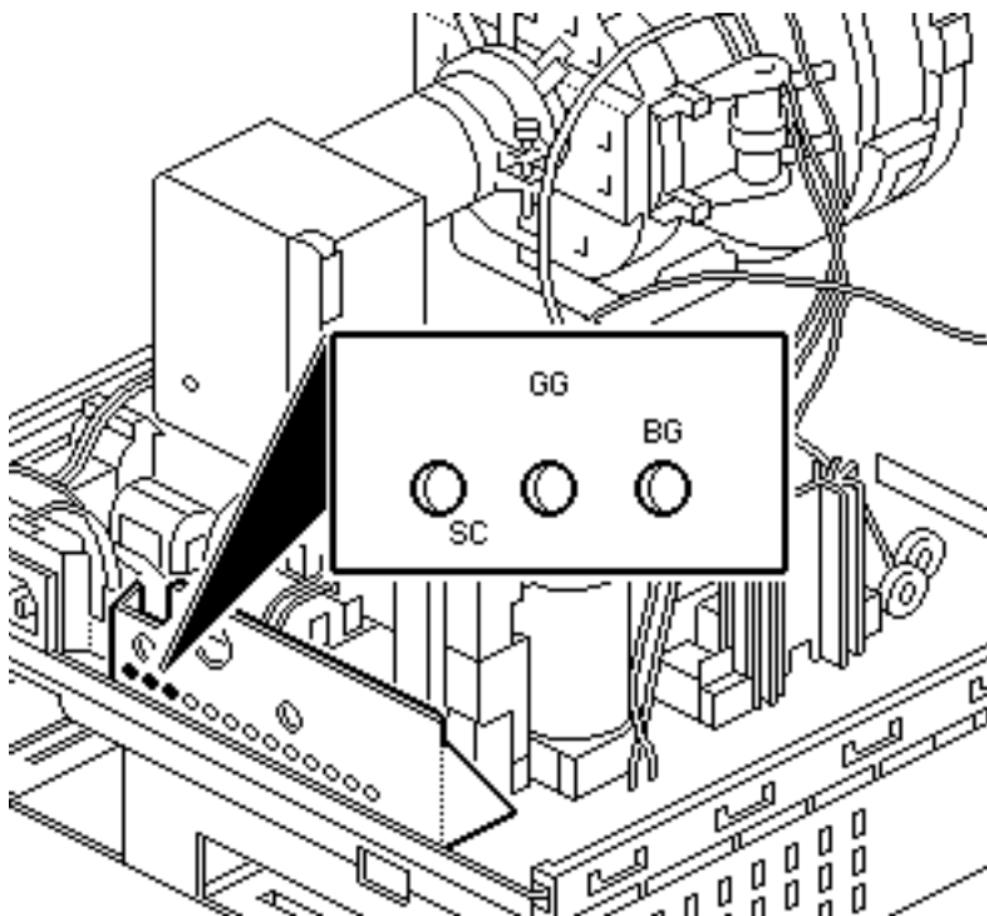3 Select the Screen Control Panel in the Control Panels folder. Drag the

brightness control to midrange.

4 Using a hex-head plastic adjustment tool, set the red (RB), green (GB), and blue (BB) background controls to the full counterclockwise positions.

5 Set the green (GG) and blue (BG) drive controls to their 3/4 position by turning the controls to their full clockwise position and then turn back 1/4 turn counterclockwise.

6 Set the sub-contrast control (SC) to its full clockwise position.

Gray Bars
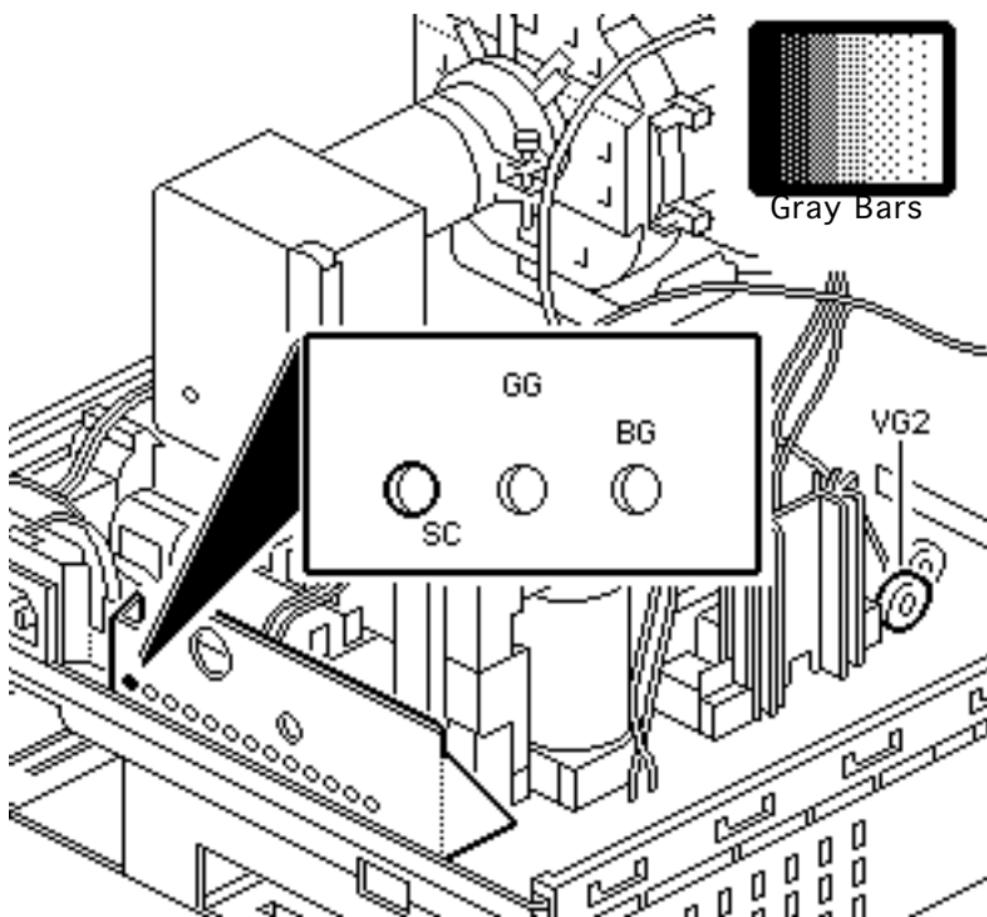
7 Using a hex-head plastic adjustment tool, adjust VG2 until the first bar in the test pattern is completely black and the second bar is barely visible.

8 Set the sub-contrast control (SC) to the center position.
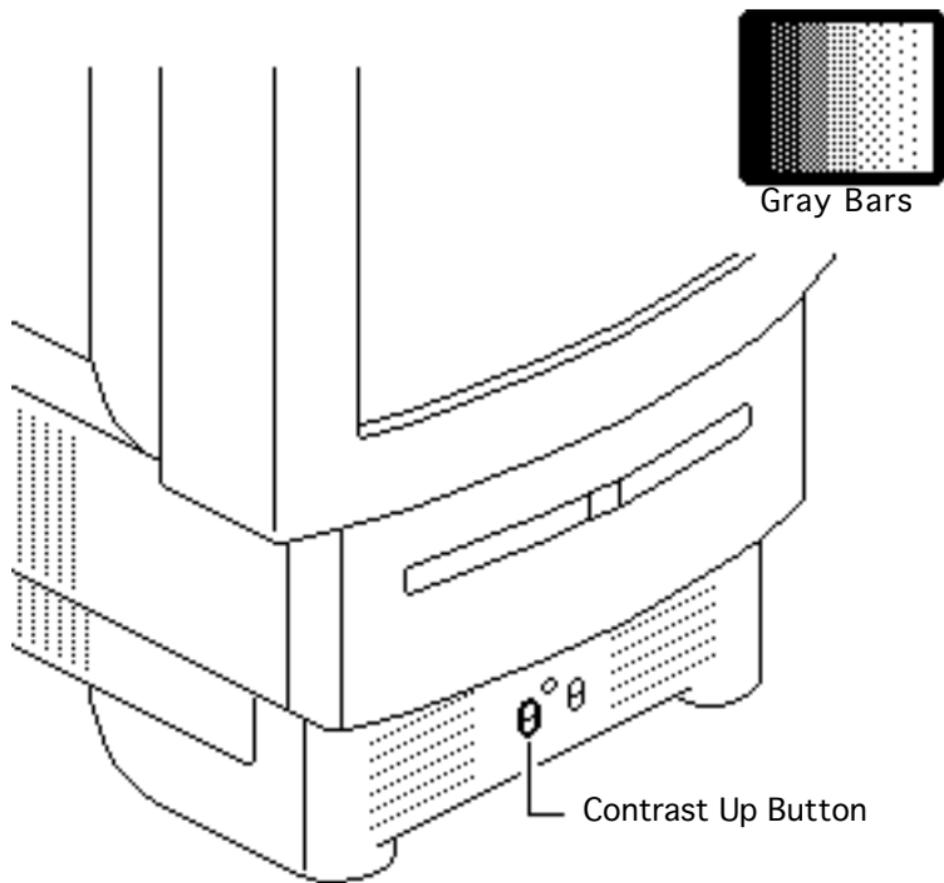
Gray Bars

White Balance

Note: Perform the cutoff and white balance adjustments after the monitor has been on for at least 10 minutes.
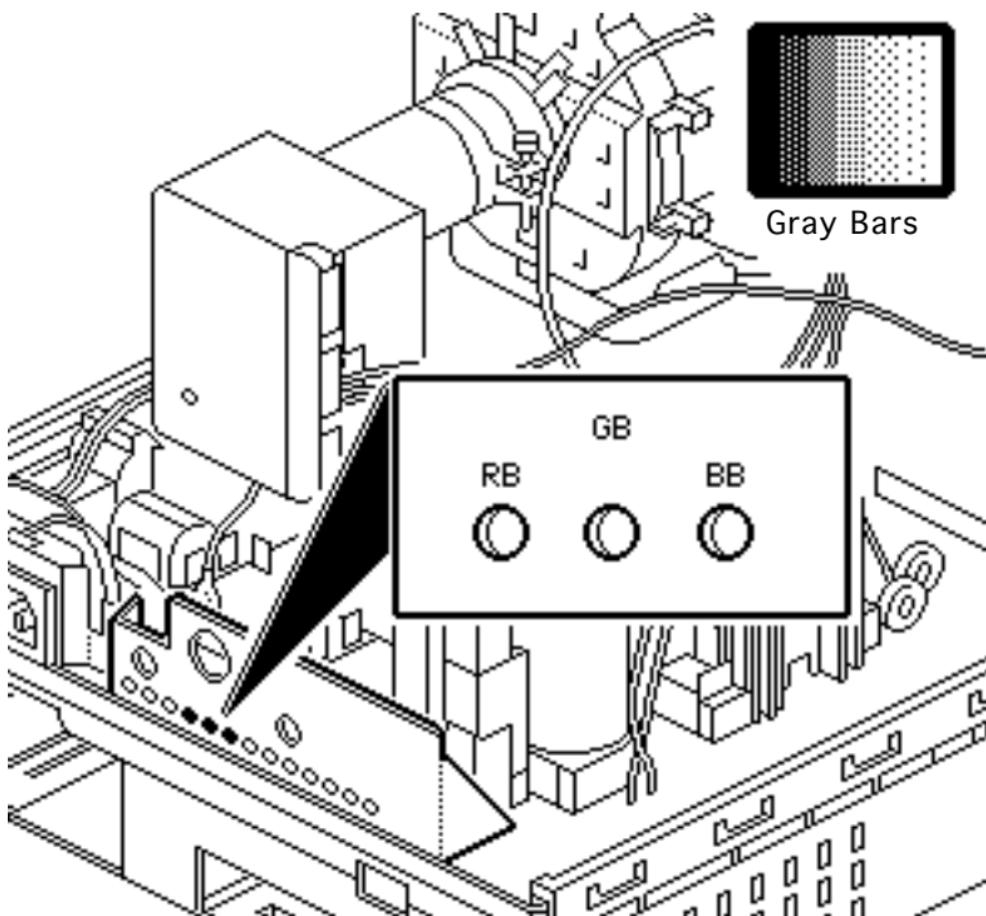
1 Use Display Service Utility to display the Gray Bars test pattern.

2 Press the Contrast Up button and set screen contrast to maximum.

Contrast Up Button

3   Select the Screen Control
    Panel in the Control
    Panels folder. Drag the
    brightness control to
    midrange.

Gray Bars

4   Note the predominant
     color.

5   Using a hex-head plastic
     adjustment tool,
     alternately adjust the
     red (RB), green (GB),
     and blue (BB)
     background controls
     until there is no
     predominant color in
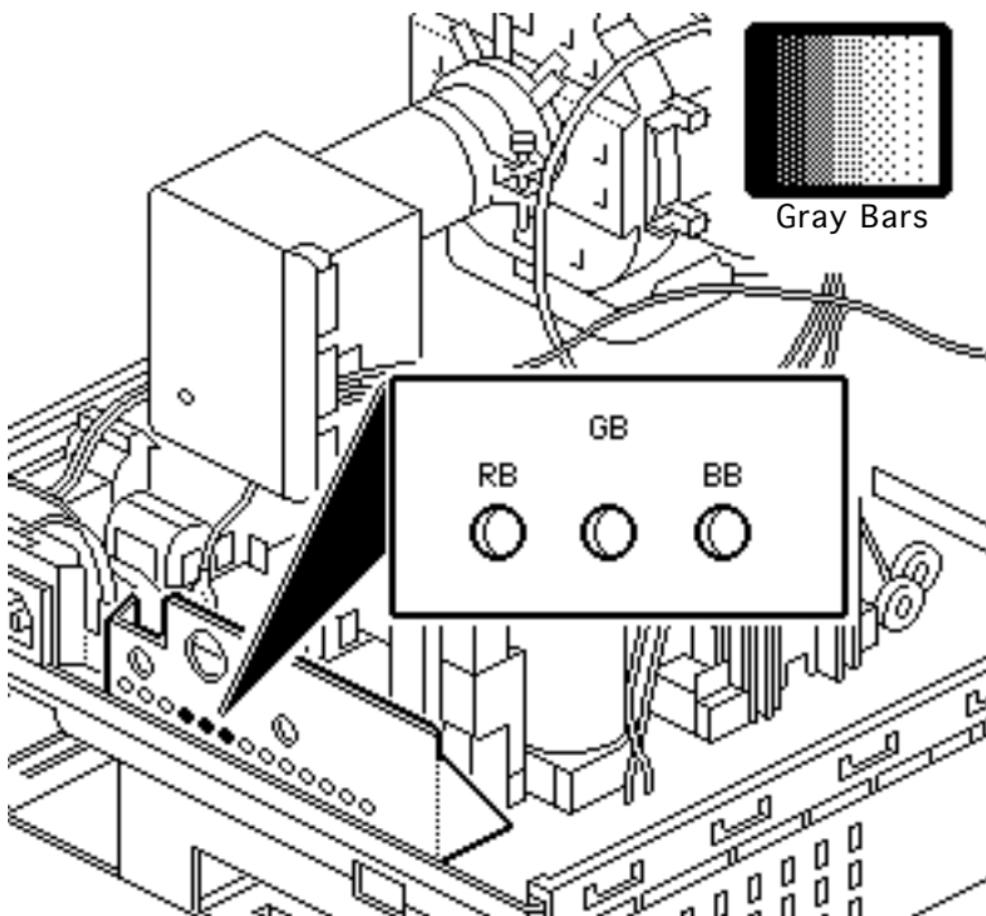   the four darkest bars.

Gray Bars
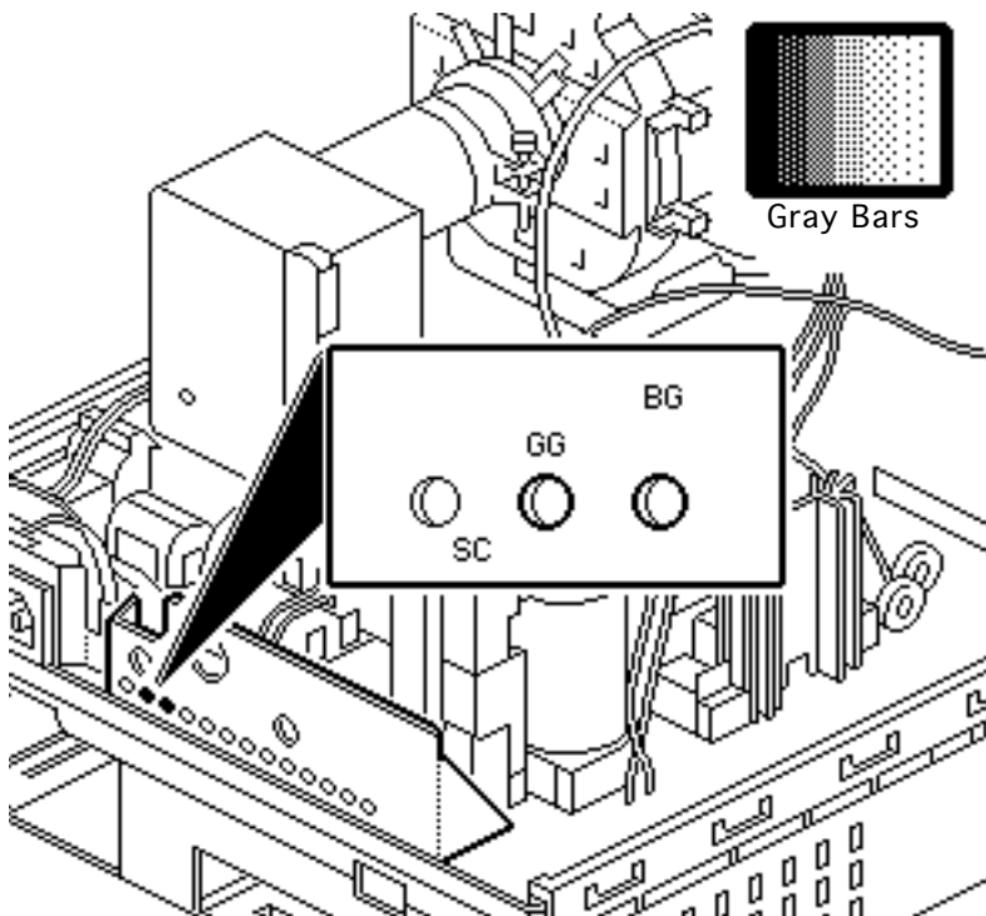
Note: The darkest bar must remain completely black throughout the rest of the procedure. If you notice a predominant color in the darkest bar, readjust the appropriate background control.
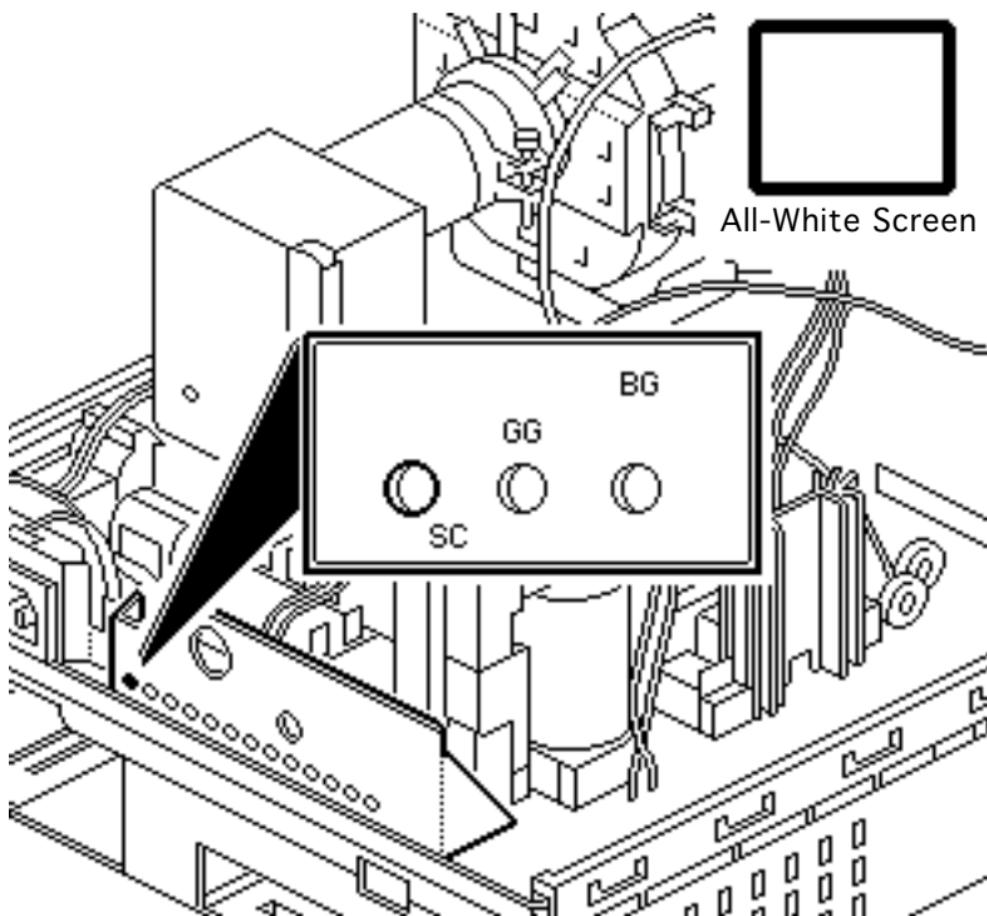
6   If necessary, adjust the blue (BG) and green (GG) drive controls until there is no predominant color in the four brightest bars.

Gray Bars

7 Check the four darkest bars, and if necessary, adjust the red (RB), green (GB), and blue (BB) background controls until there is no predominant color.

All-White Screen

8   Use Display Service
     Utility to display the
     All-White Screen test
     pattern.

9   Using the light meter,
     adjust the sub-contrast
     control (SC) until the
     luminance measures 33
     feet lamberts (± 3 foot
     lamberts), which on the
     light meter is
     • Model L-248: middle
       of the 10 scale
     • Model 246: 25 on the
       red scale

Important: Over time, light meter tolerance can vary. If you doubt your meter's accuracy, verify the readings with a known-good light meter or photometer.
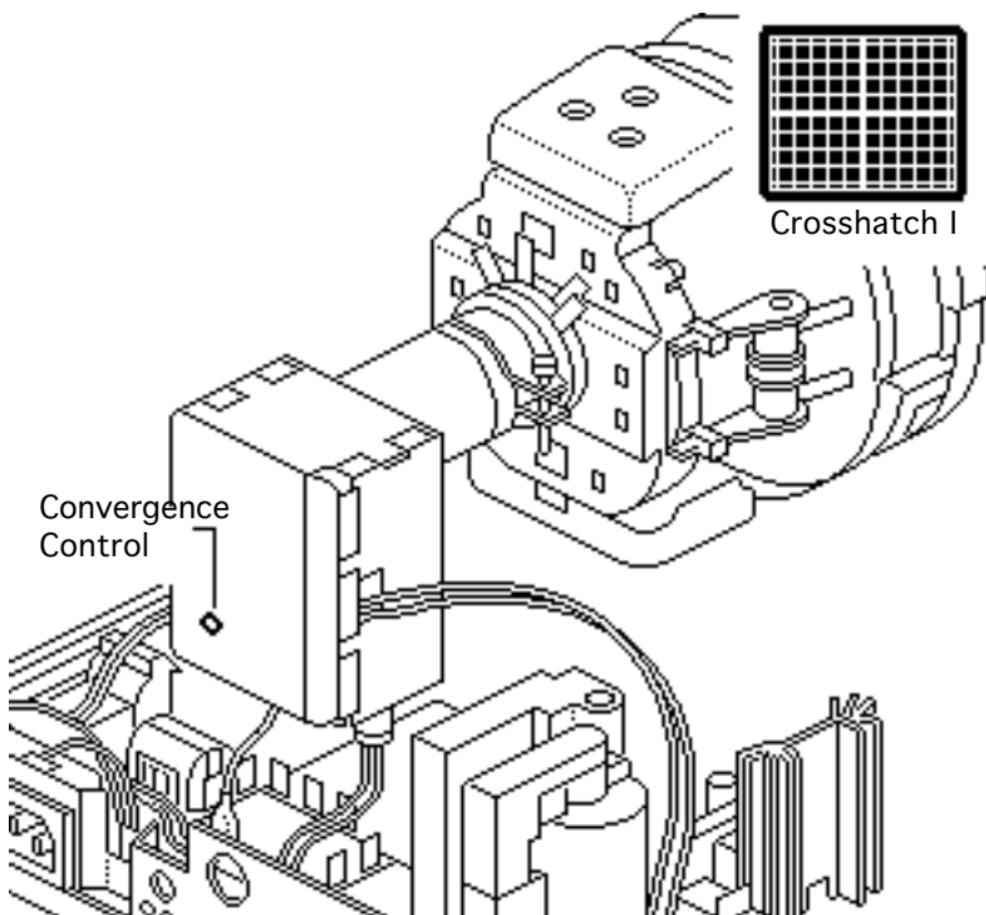
Yoke Convergence
Controls

CRT Video
Board

WARNING:
High Voltage Areas
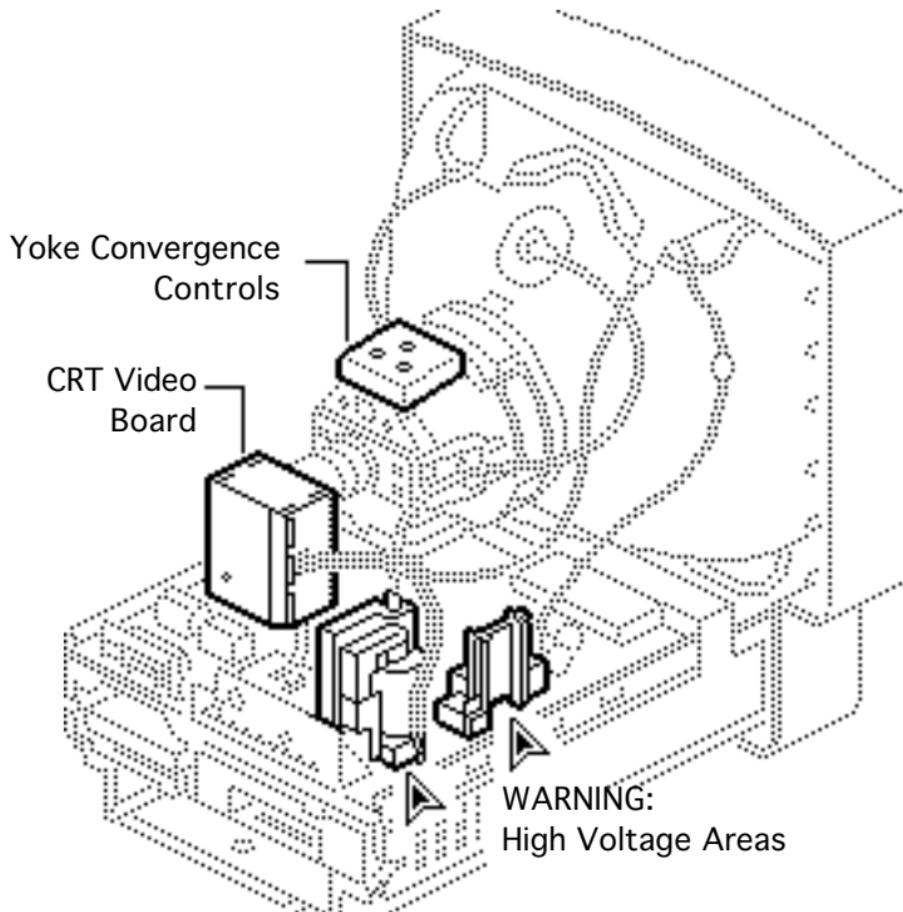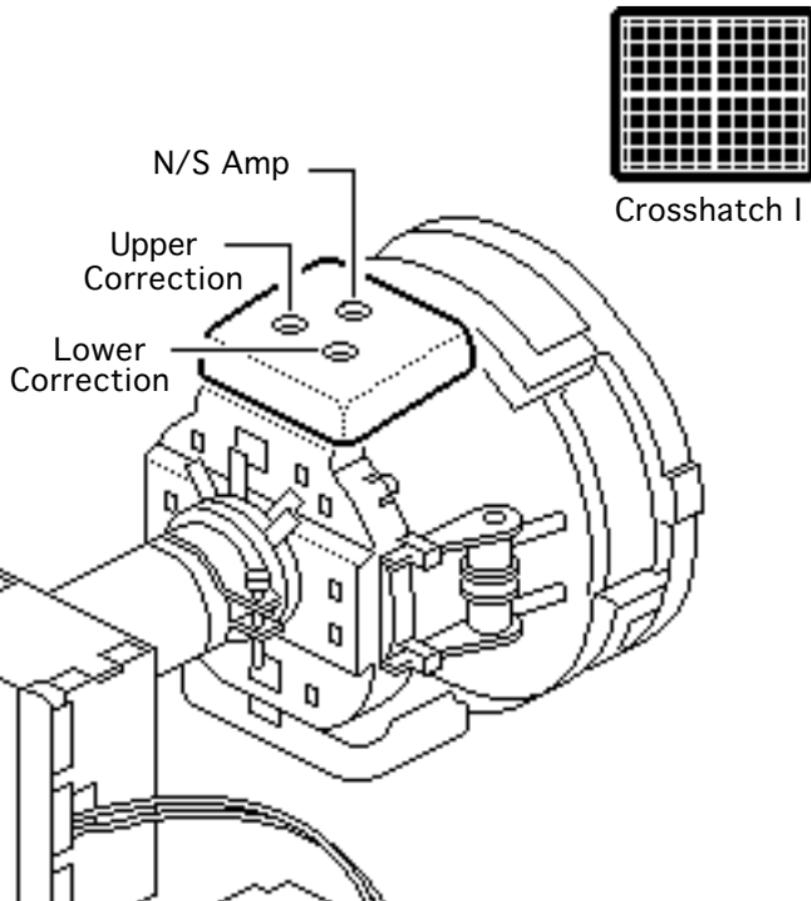
Convergence

Before you begin, remove
the rear cover.

⚠️**Warning:** This product
contains high voltage and a
high-vacuum picture tube.
To prevent serious injury,
review CRT safety in
Bulletins/Safety.

Crosshatch I

Convergence
Control

1 Use Display Service
   Utility to display the
   Crosshatch I test
   pattern.

2 Using a hex-head plastic
   adjustment tool, adjust
   the convergence control
   on the CRT video board
   for best overall
   convergence.

Crosshatch I

N/S Amp

Upper
Correction

Lower
Correction

3 Using a hex-head plastic adjustment tool, adjust the N/S amp control for best convergence of horizontal lines at the top and bottom of the screen.

4 Adjust the lower correction control for best convergence of vertical lines at the bottom of the screen.

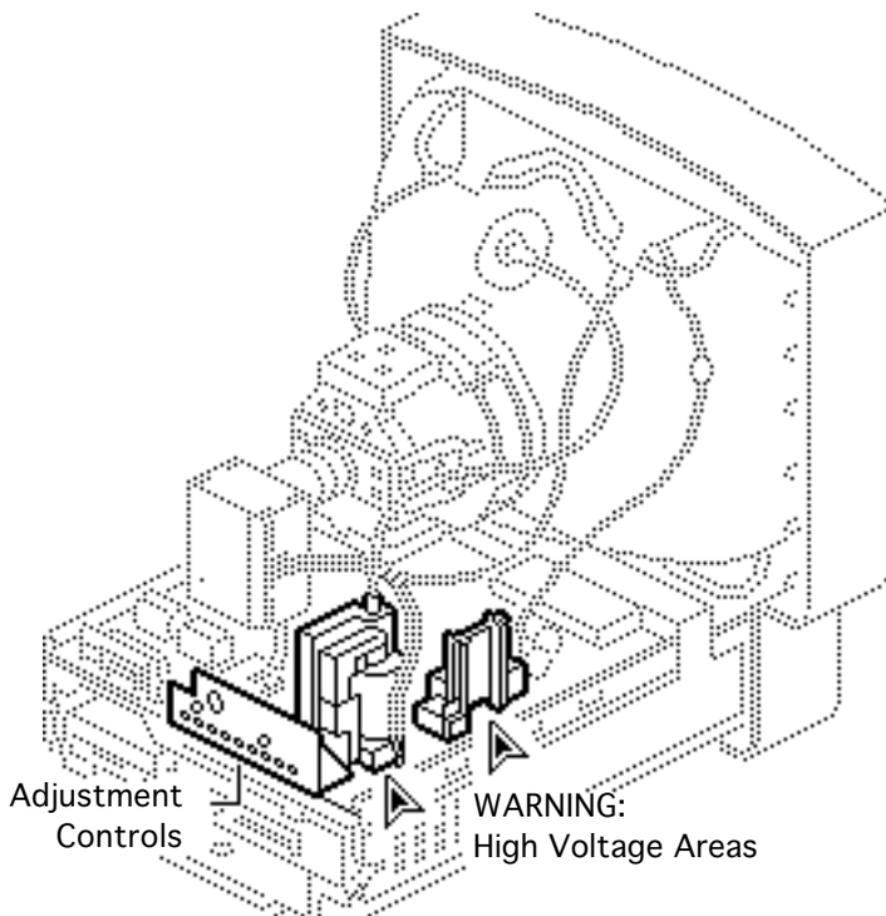5 Adjust the upper correction control for best convergence of vertical lines at the top of the screen.

Adjustment Controls
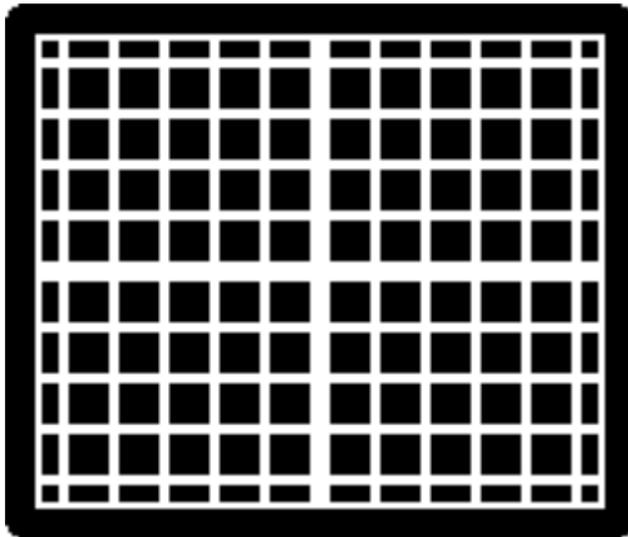
WARNING: High Voltage Areas

Geometric Distortion

Before you begin, remove the rear cover.

⚠️**Warning:** This product contains high voltage and a high-vacuum picture tube. To prevent serious injury, review CRT safety in Bulletins/Safety.

Crosshatch I

1   Use Display Service
    Utility to display the
    Crosshatch I test
    pattern.

2   Verify that the boxes on
    the top row are the same
    size as the boxes on the
    bottom row, and the
    boxes on the left side are
    the same size as the
   boxes on the right side.

⚠️ **Warning:** The entire yoke assembly has very high voltage. To prevent electrical shock, do not touch the yoke assembly, the anode wire, or the yoke wires.

Horizontal Bow

or

Pin Phase

or

Vertical Angle

or

3   To determine which control to adjust, compare the display with the distortions shown.

4   Using a hex-head plastic adjustment tool, adjust the control (see next page for control locations).

KS   VS

PB   HS   PR
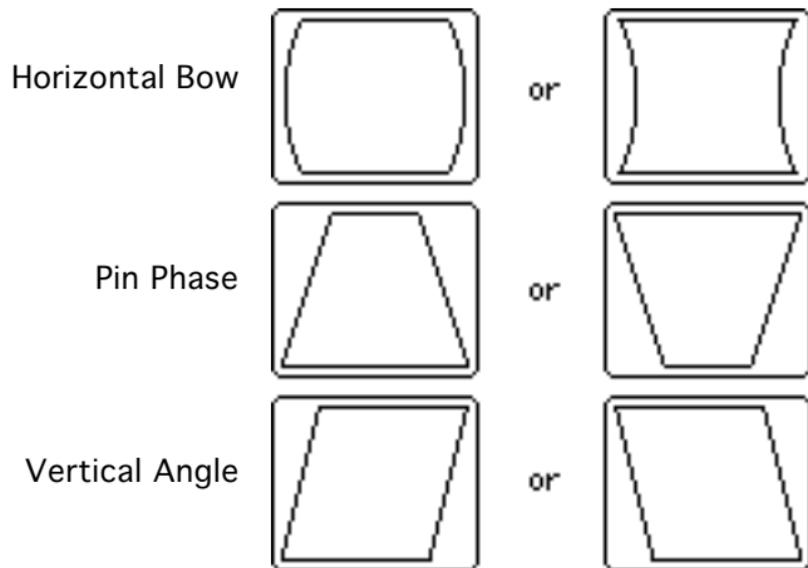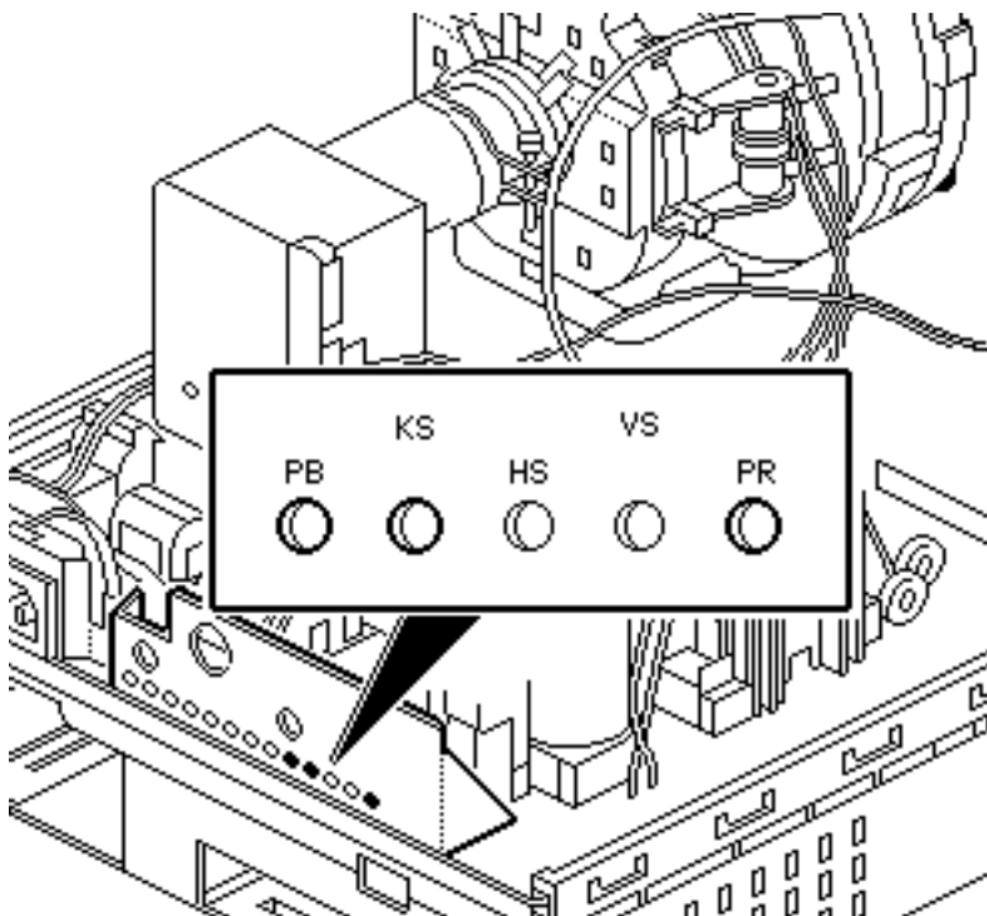
5   Using a hex-head plastic adjustment tool, adjust the control that is appropriate for the distortion.

6   If the display is so distorted that you can't tell which adjustments to make, perform the adjustments in the following sequence:
    • Pin Phase (KS)
    • Vertical Angle (PR)
    • Horizontal Bow (PB)
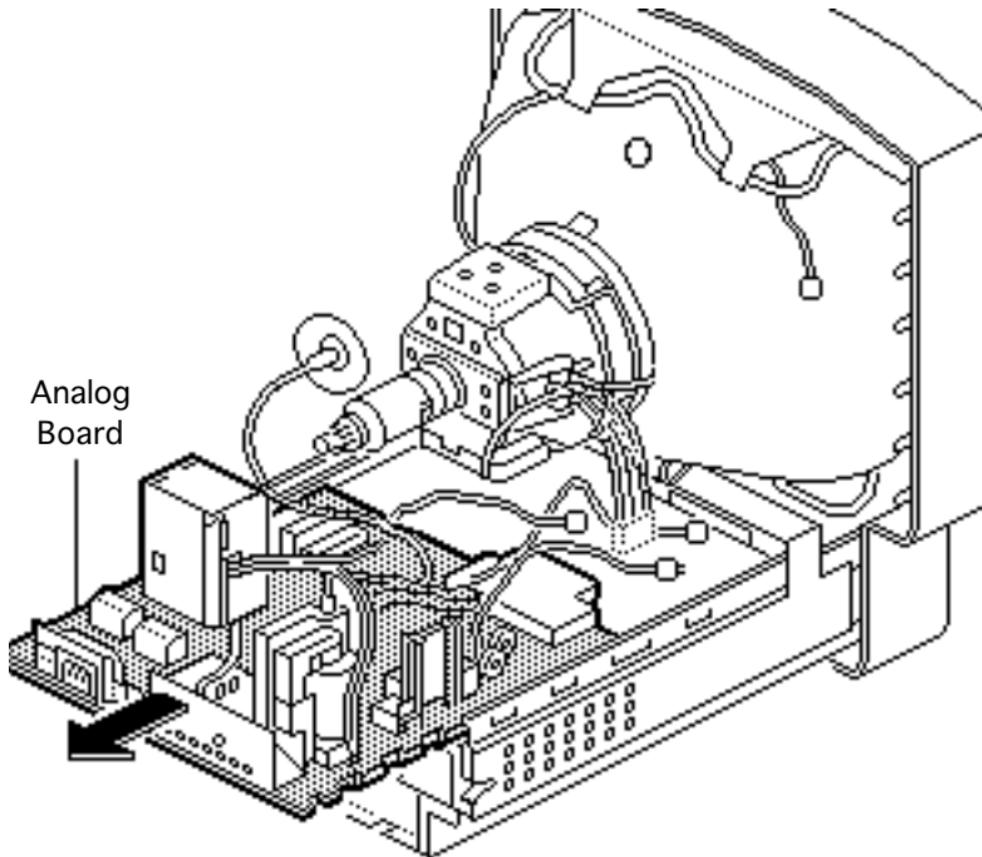
Analog
Board

7 If the display is still
   distorted, repeat the
   vertical angle and pin
   phase adjustments.

8 If you can't correct the
   distortion, replace the
   analog board. See
   "Analog Board" in the
   Take Apart chapter.

Plastic Yoke Collar

Yoke Clamp
Screw

WARNING:
High Voltage Areas
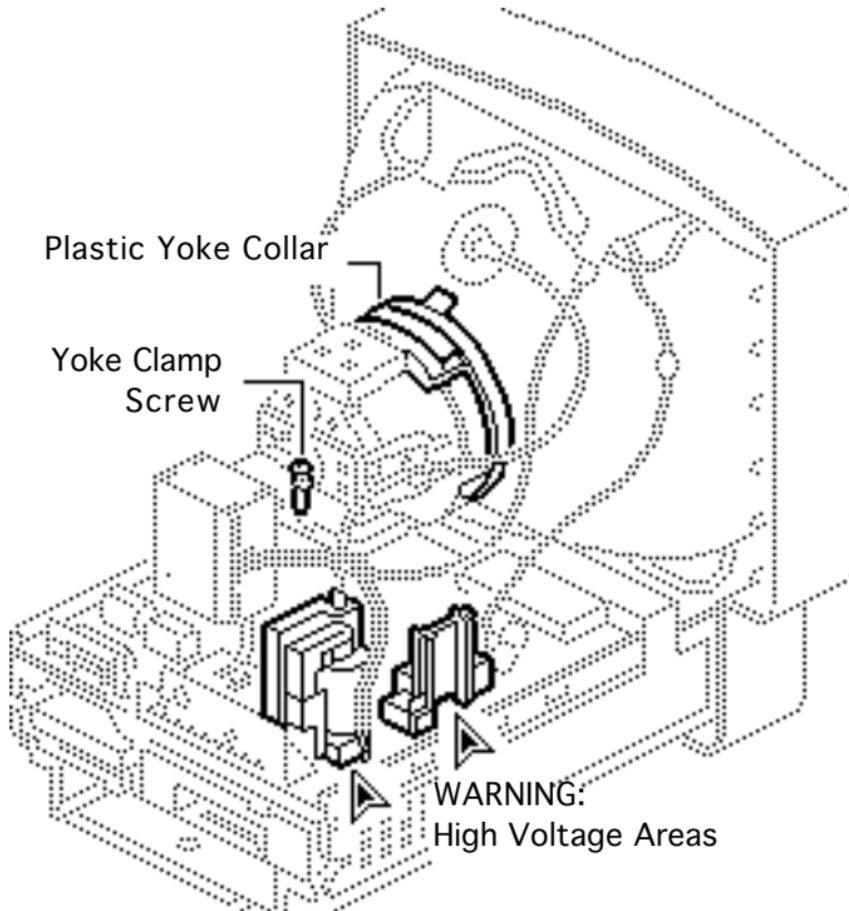
Yoke

Before you begin, remove the rear cover.

⚠Warning: This product contains high voltage and a high-vacuum picture tube. To prevent serious injury, review CRT safety in Bulletins/Safety.

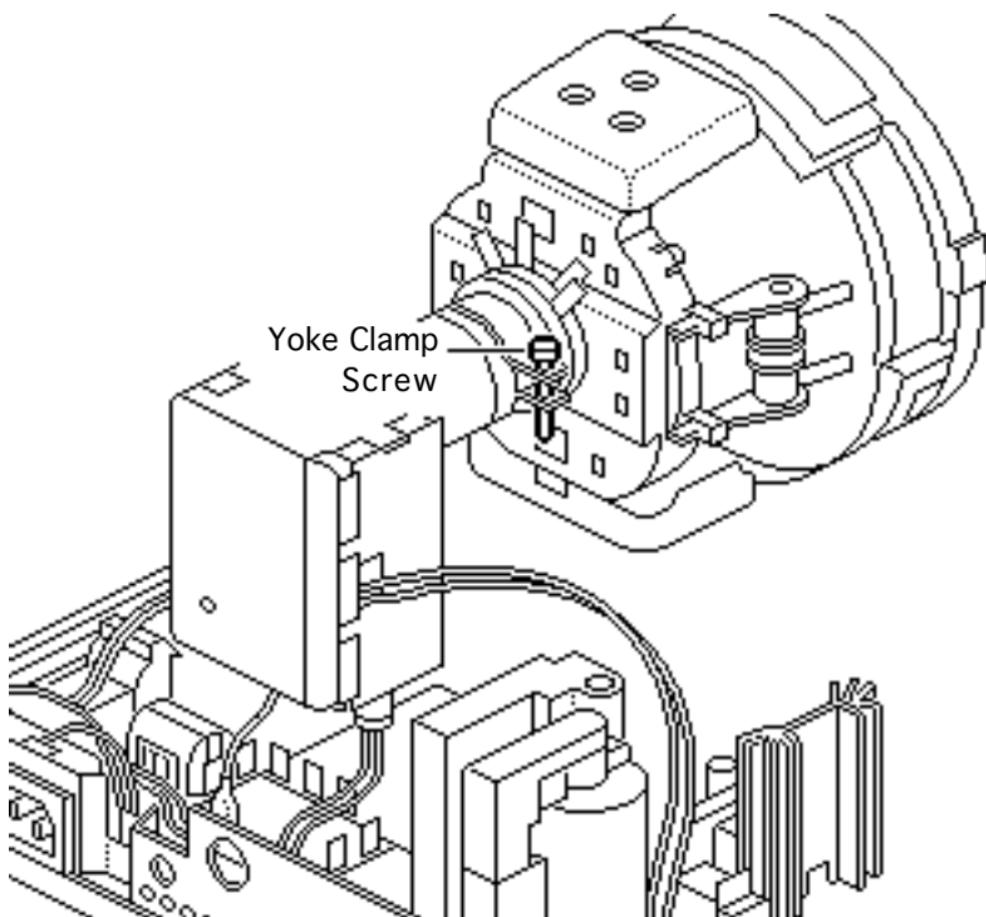**⚠ Warning:** Because you must make yoke adjustments from the rear of the computer, use a mirror to view the computer screen. Do not reach around the computer to adjust collars and rings.

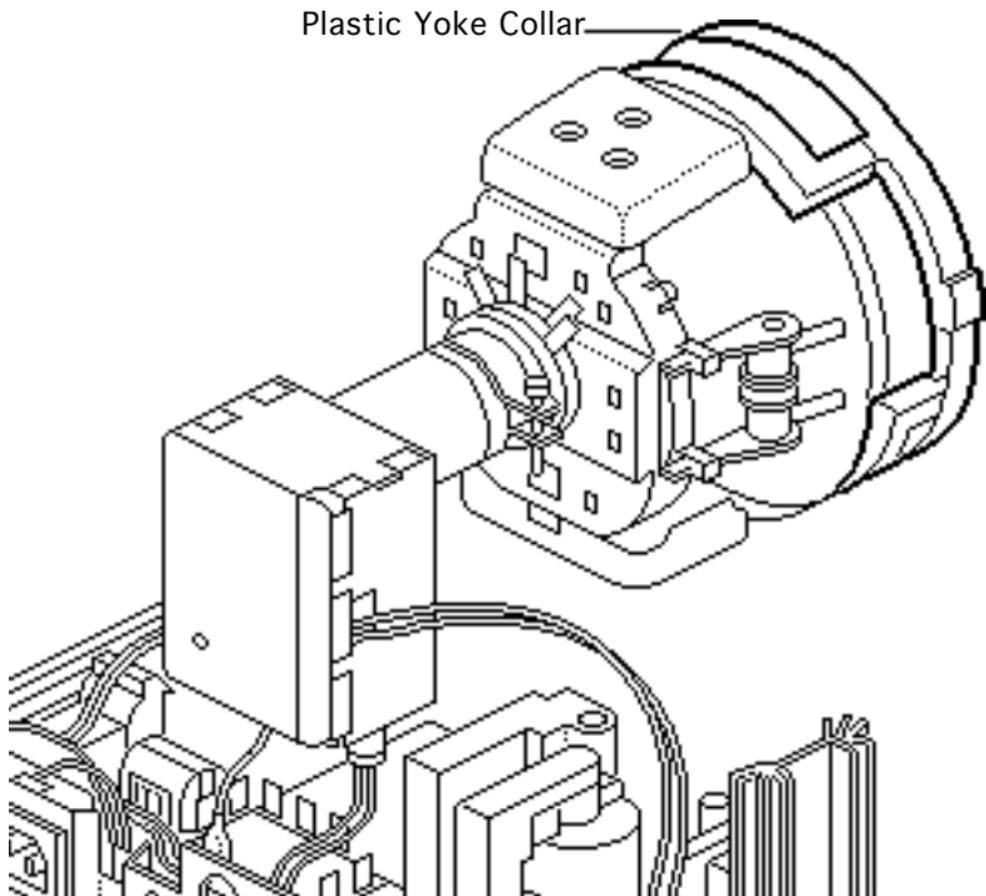**Note:** If you replace the CRT, you will probably need to adjust the yoke.

Yoke Clamp Screw

1. Using an insulated Phillips screwdriver, loosen the yoke clamp screw two or three turns.

2. Switch on the computer.

Plastic Yoke Collar

3   With one hand, grasp
    the plastic yoke collar
    and rotate it until the top
    and bottom edges of the
    picture are parallel with
    the top and bottom of the
    bezel.

Plastic Yoke Collar
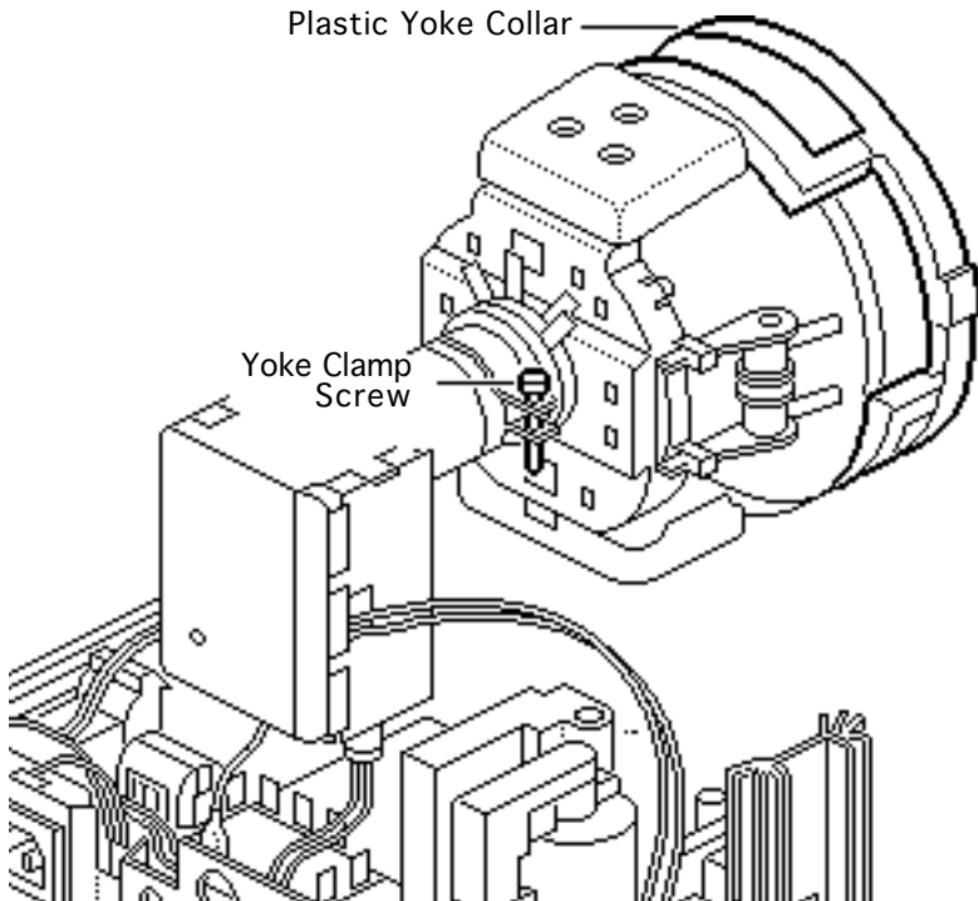
Yoke Clamp
Screw

4 Switch off and unplug the computer.

5 Discharge the CRT.

6 Hold the plastic yoke collar in position and carefully tighten the yoke clamp screw so that the collar cannot slip. Do not overtighten the screw.

7 Replace the rear cover and switch on the computer.

8   Verify that the top and
    bottom edges of the
    picture are parallel with
    the top and bottom of the
    bezel.

Side Switch
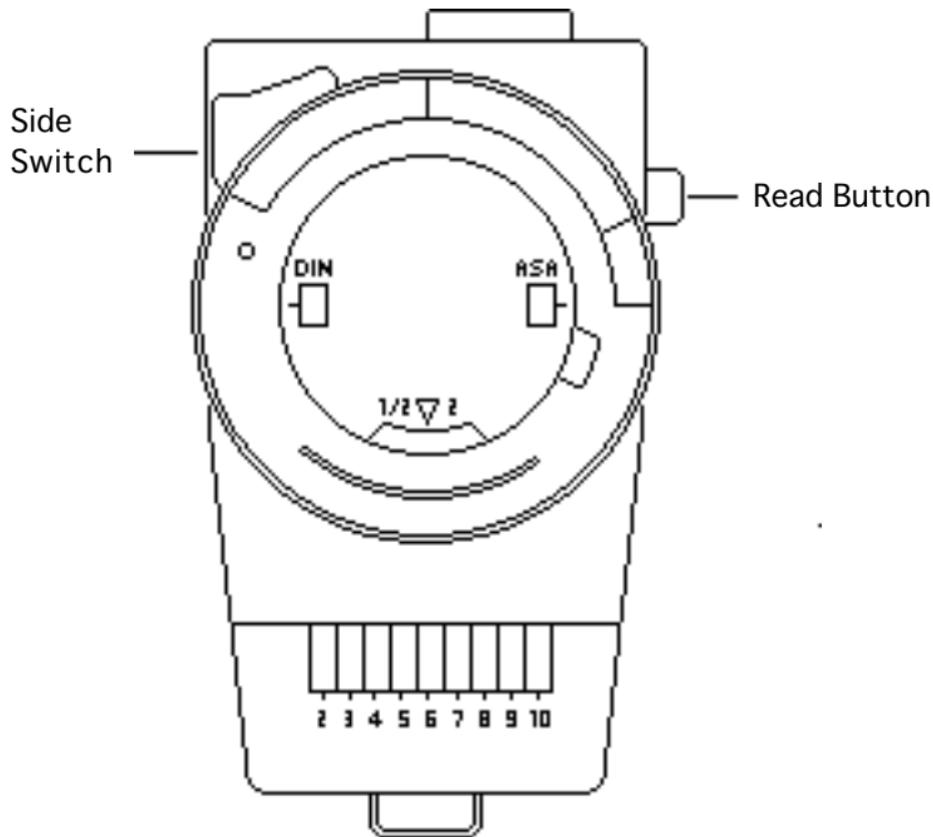
Read Button

Light Meter Setup

Note: This topic covers setup for two light meters: Models L-248 and 246.

Model L-248

1 Press the red button on the back of the light meter. If the reading is out of the red bar, replace the battery.

2   Luminance tests will
    instruct you to move the
    side switch either to the
    low position (2-10) or
    the high position (10-
    18) to get a reading.

3   Uncover the lens of the
    meter.

4   Place the lens against the
    middle of the screen and
    press the Read button.

Lens

Red Scale

Model 246

Note: Remove the metal slide, if installed, from the top of the light meter. Install the white lens with the red dot.

1 Rotate the lens for the meter so the lens faces the monitor and the scale faces you.

2 Use your hand to shield the lens from ambient light.

3 Place the lens against the middle of an all-white screen.
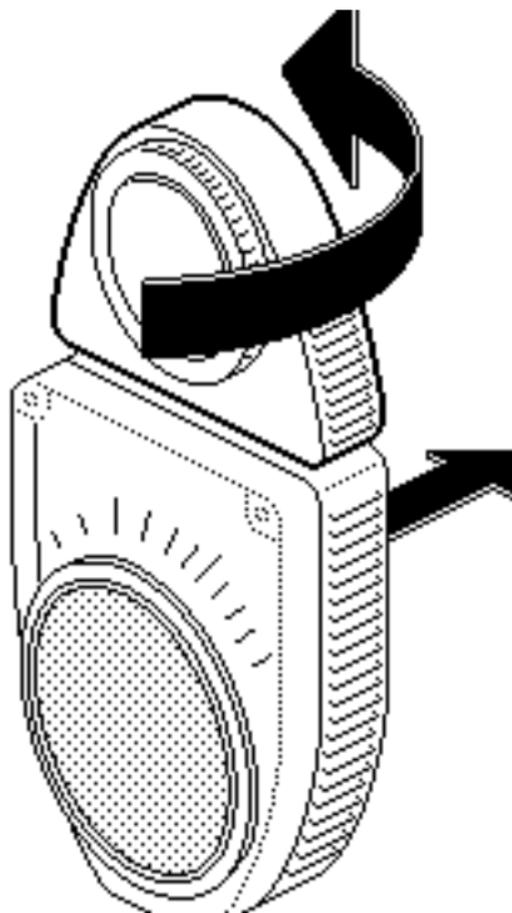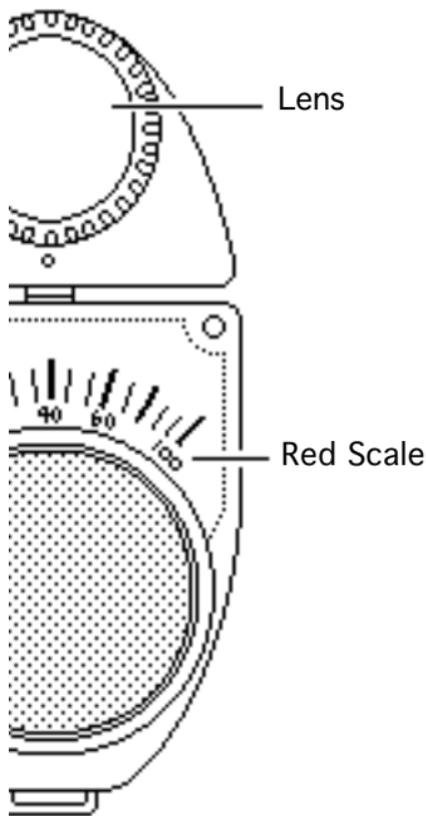
4 Read the red scale while
   you perform the
   Brightness and Contrast
   adjustments in the Video
   topic.

Exploded View

Macintosh LC 520, 550, 575

Exploded View

I/O Door
922-1827
922-0704 (LC 575)

Screw

Rear Case
Access Cover
815-1154

Rear Case
Access
Cover Shield
805-0137

CRT
661-1666
661-1667
(Australia)
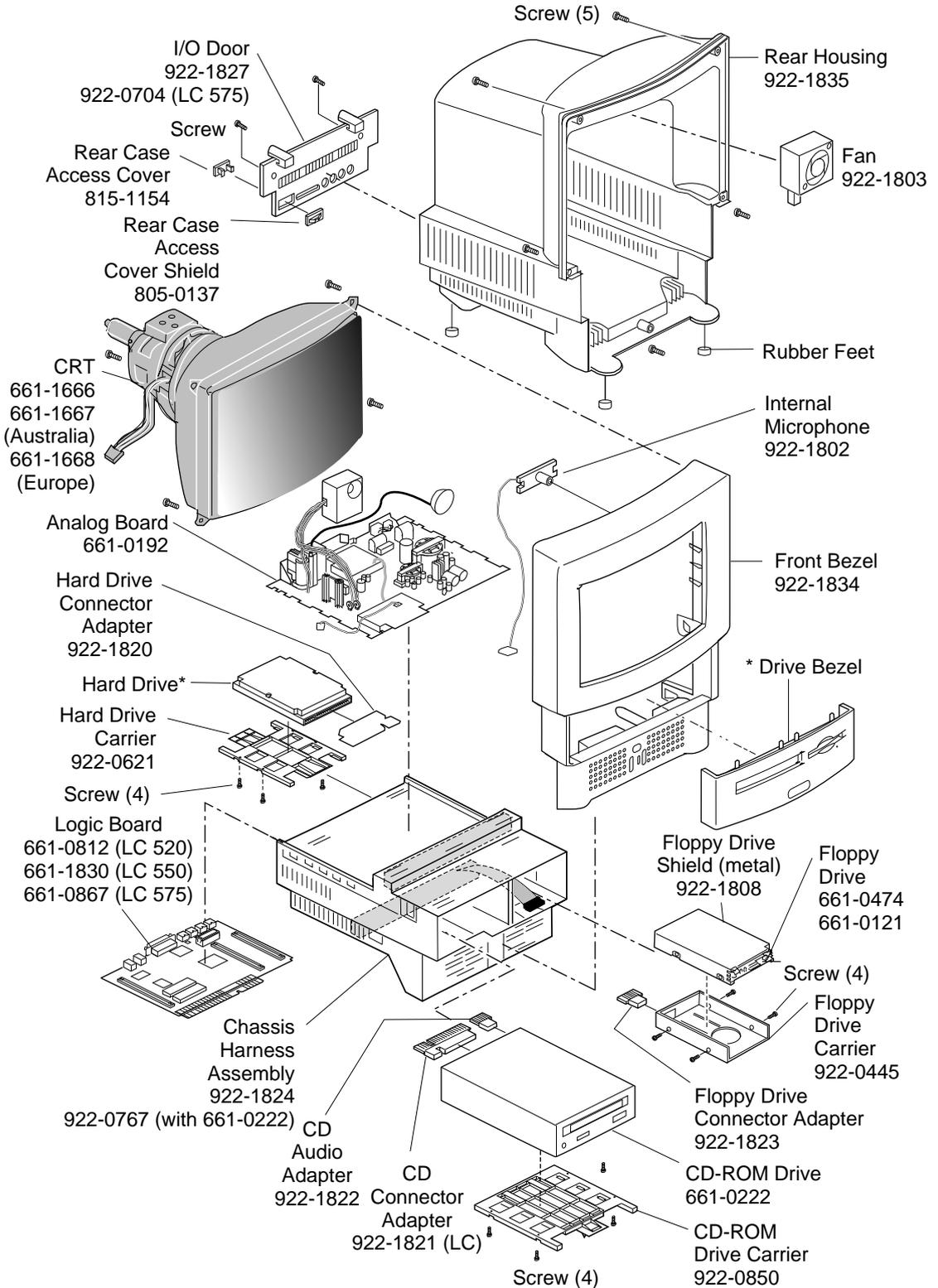661-1668
(Europe)

Analog Board
661-0192

Hard Drive
Connector
Adapter
922-1820

Hard Drive*

Hard Drive
Carrier
922-0621

Screw (4)

Logic Board
661-0812 (LC 520)
661-1830 (LC 550)
661-0867 (LC 575)

Chassis
Harness
Assembly
922-1824
922-0767 (with 661-0222)

CD
Audio
Adapter
922-1822

CD
Connector
Adapter
922-1821 (LC)

Screw (4)

Screw (5)

Rear Housing
922-1835

Fan
922-1803

Rubber Feet

Internal
Microphone
922-1802

Front Bezel
922-1834

* Drive Bezel

Floppy Drive
Shield (metal)
922-1808

Floppy
Drive
661-0474
661-0121

Screw (4)

Floppy
Drive
Carrier
922-0445

Floppy Drive
Connector Adapter
922-1823

CD-ROM Drive
661-0222

CD-ROM
Drive Carrier
922-0850

*This is a generic representation of a product family. Configurations may vary.
For number of part with asterisk, see parts list.*